VOLUME LV
NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1929

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TO carry out the purposes for which it was founded forty-one years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and has contributed $25,000 to Commander Byrd's Antarctic Expedition.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society has conducted extensive excavations at Pueblo Bonito, New Mexico, where prehistoric peoples lived in vast communal dwellings before the days of Columbus; it is sponsoring an ornithological survey of Venezuela, and is maintaining an important photographic and botanical expedition in Yunnan Province, China.

TO further the study of solar radiation in relation to long range weather forecastings, The Society has appropriated $65,000 to enable the Smithsonian Institution to establish a station for five years on Mt. Brukkaros, in Southwest Africa.

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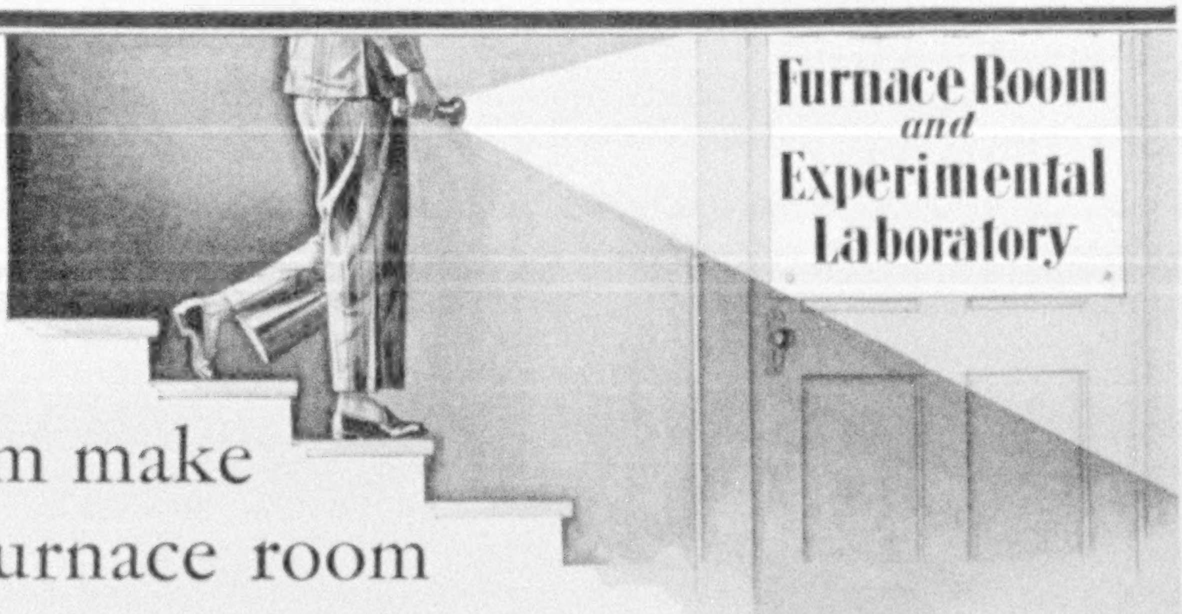

Don't let them make your furnace room an *experimental laboratory*

THE country-wide "declaration of independence" from hand-fired furnaces has resulted in a flood of new devices. In one city, in 1928, fifty-eight different makes of automatic and semi-automatic devices were installed. How many of them will be in service even next year only the endurance test of time will tell.

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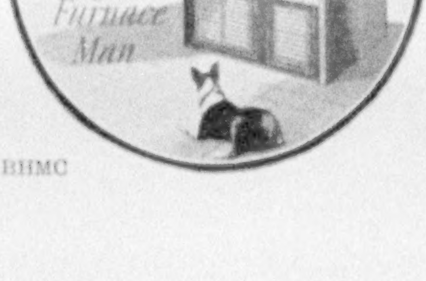
throw away your furnace room tools—eliminate fuel storage—make a single match your winter's kindling—tend furnace by the calendar, not by the clock—live in a warm house, sleep in a cool one—laugh at blizzards—and enjoy winter.

BRYANT GAS HEATING


-lets your Pup be your Furnace Man

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It is not too much to say that passing from another car into a *Fisher Body* car is like stepping from an ordinary room into an extraordinary one

You immediately sense the superior beauty of a richly designed and decorated room—and you immediately see the greater luxury and fineness of a Fisher Body car. ¶ This contrast exists between every car in the Fisher Body group and any car in its price field outside that group. ¶ You see at once that the upholstery—designed in pattern and specially woven for Fisher Body—is of a higher grade. ¶ The same superiority meets your eye in the interior fittings, carpeting, genuine plate glass and exterior finish. ¶ You can spell out in a few moments' inspection innumerable superiorities pointing plainly to the fact that Fisher Body cars, by reason of Fisher Bodies alone, are worth much more in dollar value. ¶ The whole question has come down to a matter of perfectly plain, easily discerned, finer quality—directly traceable to the fact that no body facilities in the world are comparable with Fisher Body facilities.

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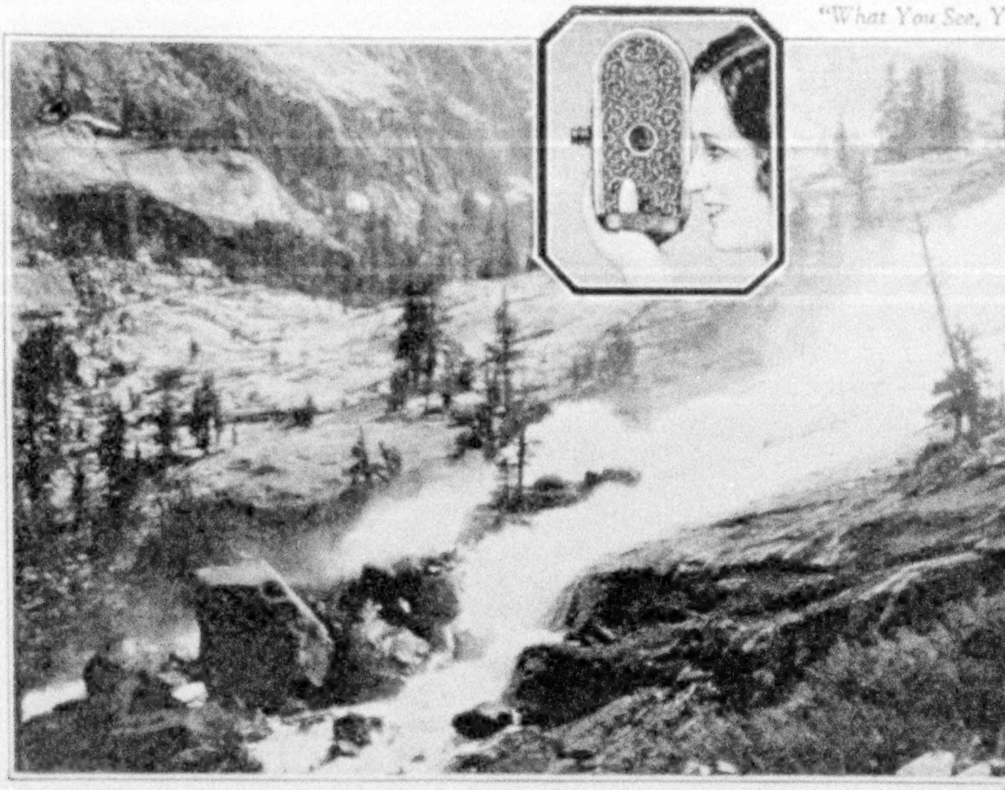

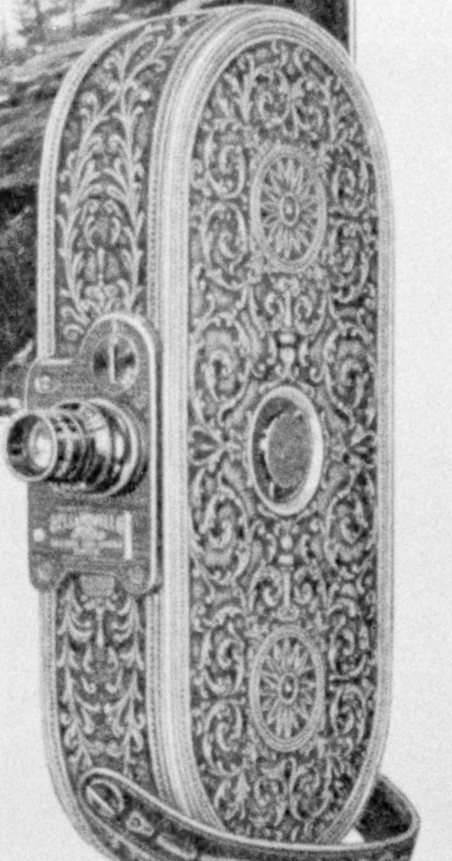

Make FILMO Movies

. . . and add another thrill to summer travel

For travel or graduation—no gift could be more appropriate, nor be appreciated more, than a Filmo *personal* movie camera. Filmo movies are as important as the events they picture because they are living bits of today's experiences saved for your enjoyment tomorrow and through the years to come.

Operating Bell & Howell Filmo Cameras is easier than taking snapshots. Anyone can make beautiful, vivid pictures of professional quality—even under light conditions that would doom ordinary snapshots to failure. Just look through the spyglass viewfinder, press the button and "What you see, you get."

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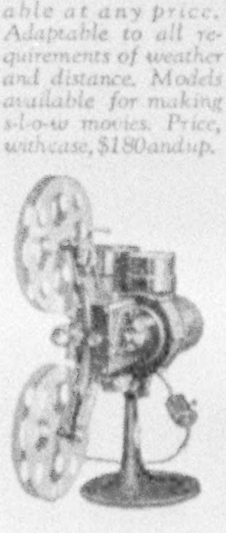
Plans for the summer are not complete unless Filmo is included in your equipment. See your nearest Filmo dealer for a demonstration now, or write for illustrated booklet "What You See, You Get."

Filmo 75

The beautiful pocket size movie camera—weighs only 3½ pounds and carries 100 ft. of 16 mm. safety film. Ideal for travel, field and sports use. Available in three rich colors—Walnut Brown, Ebony Black and Silver Birch. Price, including carrying case, $120.

Filmo 70

The finest personal movie camera available at any price. Adaptable to all requirements of weather and distance. Models available for making s-l-o-w movies. Price, with case, $180 and up.



Filmo Projector

Projects flickerless pictures of theater brilliance and is adaptable for Kodacolor projection. Simple and compact, operates from any light socket. Price, with carrying case, $190 and up.

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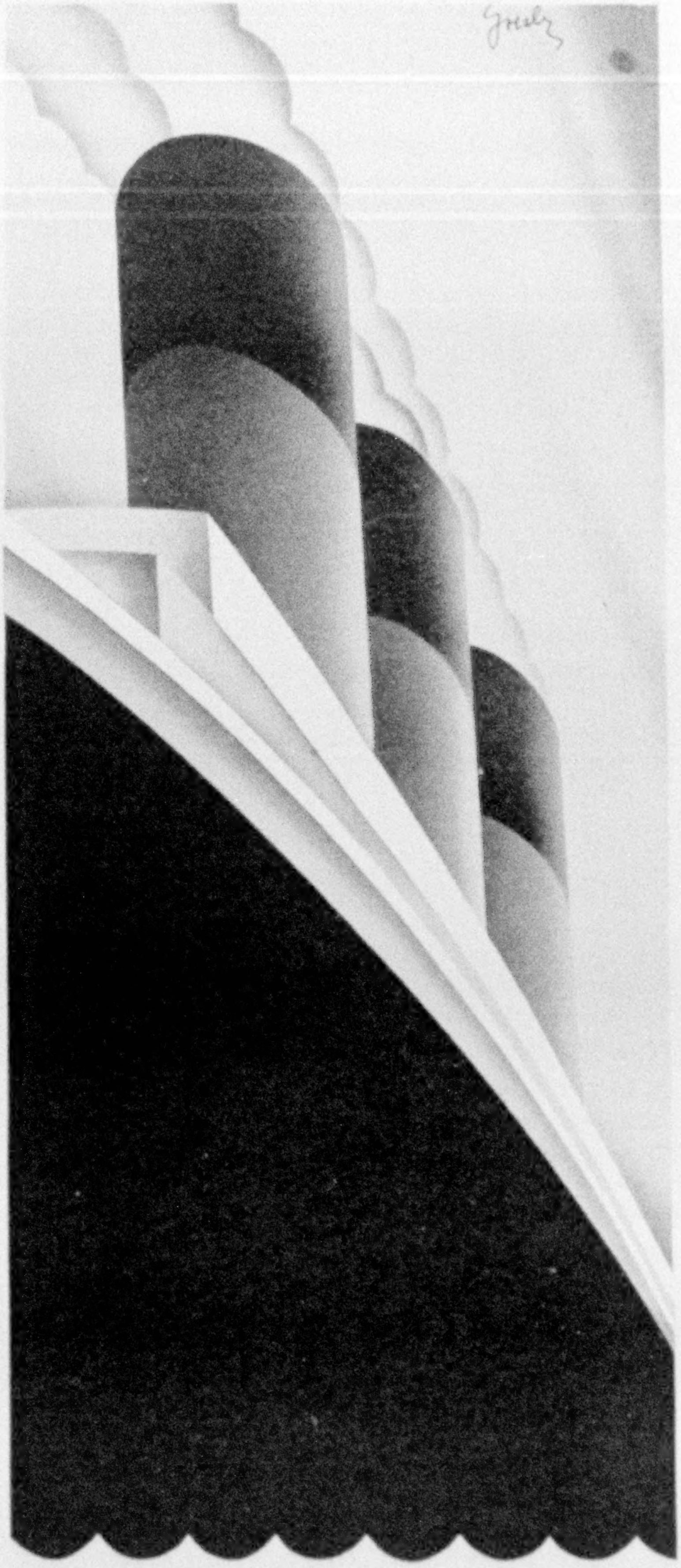

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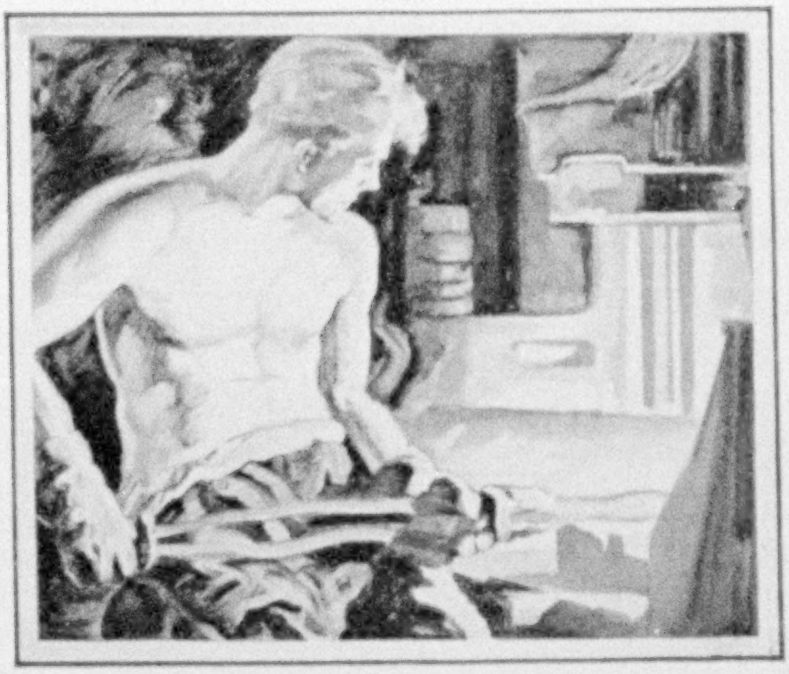


Only where talent and industry are rewarded, can the highest standard of quality craftsmanship be maintained

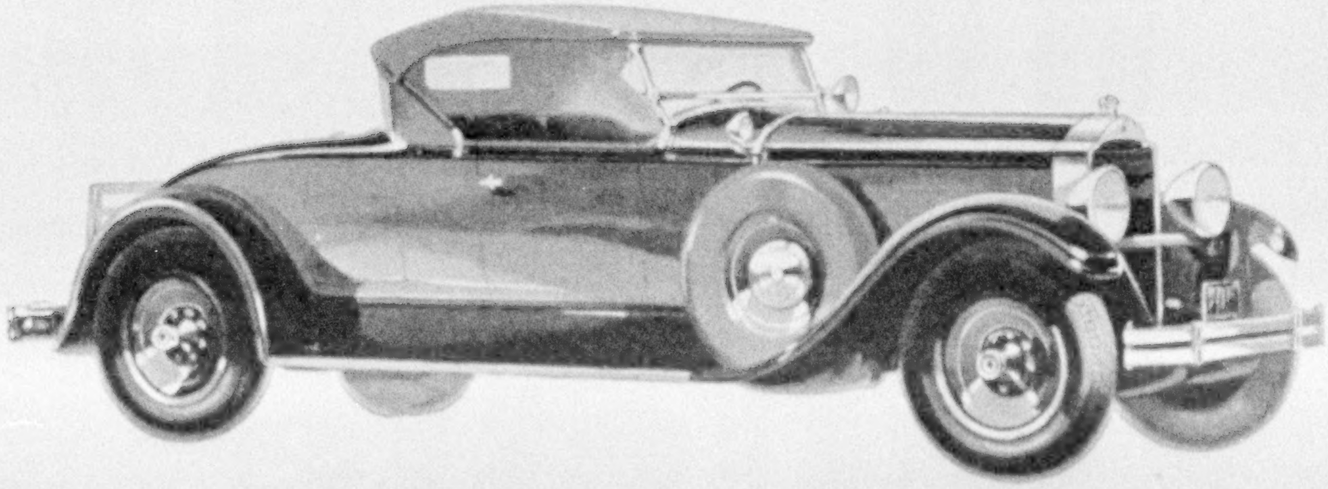
Packard men are carefully chosen. Their native skill is enhanced by Packard training. Inspection is rigid, but supervision is friendly and helpful. Initiative is fostered—aptitude rewarded. Merit may always be sure of recognition.

The human element is all-important. No other factor—design, engineering, methods or materials—overshadows craftsmanship in its contribution to the high quality of Packard cars.

And so at Packard there has been developed an organization of automobile artisans, schooled to one standard of quality workmanship—the highest.

Thousands of Packard craftsmen have been at their duties for five and more years—hundreds upwards of a decade. Their loyal and intelligent co-operation has helped measurably to build Packard's priceless reputation for outstanding leadership in the fine car field.

ASK THE MAN WHO OWNS ONE



GIVE A GILLETTE A REAR WHEEL TEST ▲▲▲▲▲

LONG mileage on a rear wheel is the only true test of any tire. Constant friction between road and rubber isn't all that wears out a tire. It's the twists of traction—sudden starts—sizzling speed.

Gillette Tires are built to withstand the most severe rear wheel tests. Gillette has pioneered and perfected processes that make a truly better tire. More pure, live rubber is used around the cords—cushioning them against shock and strain. Tougher and more massive treads give added protection to the cords and longer life to the tires.

Give a Gillette a rear wheel test, on your own car, alongside any other tire. Check the results. Prove to your own satisfaction that a Gillette will outwear any other tire at anywhere near the price. Then you'll want Gillettes all around.

GILLETTE RUBBER CO, Eau Claire, Wis.

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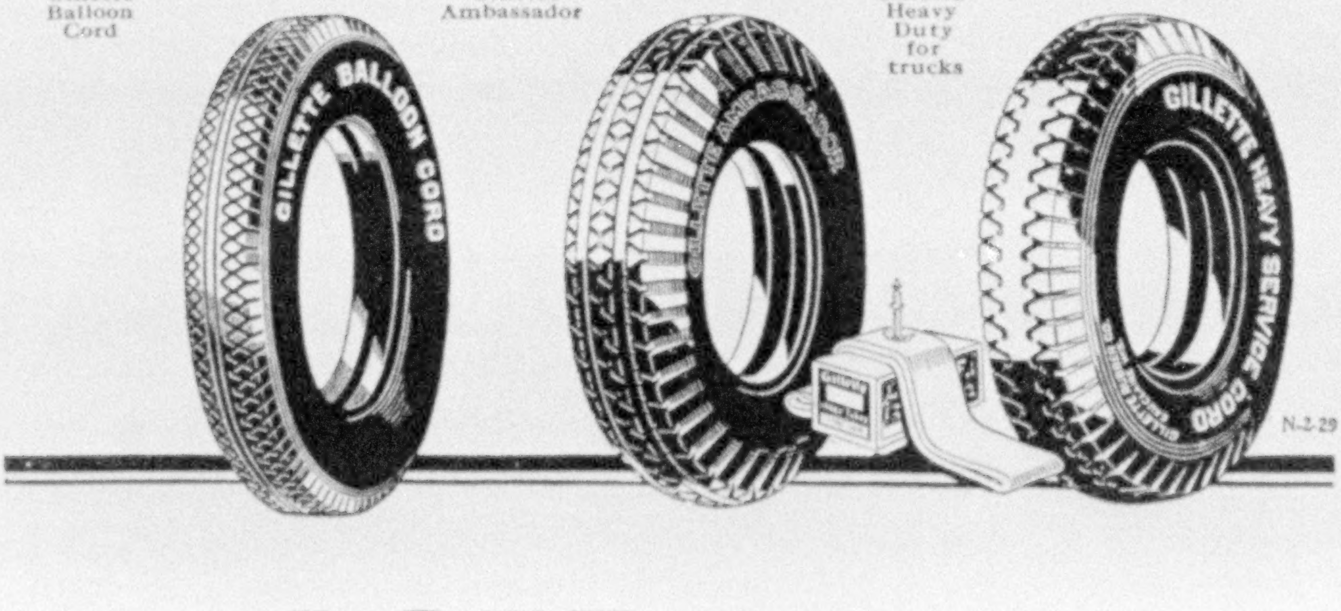
Gillette Ambassador

Gillette Heavy Duty for trucks



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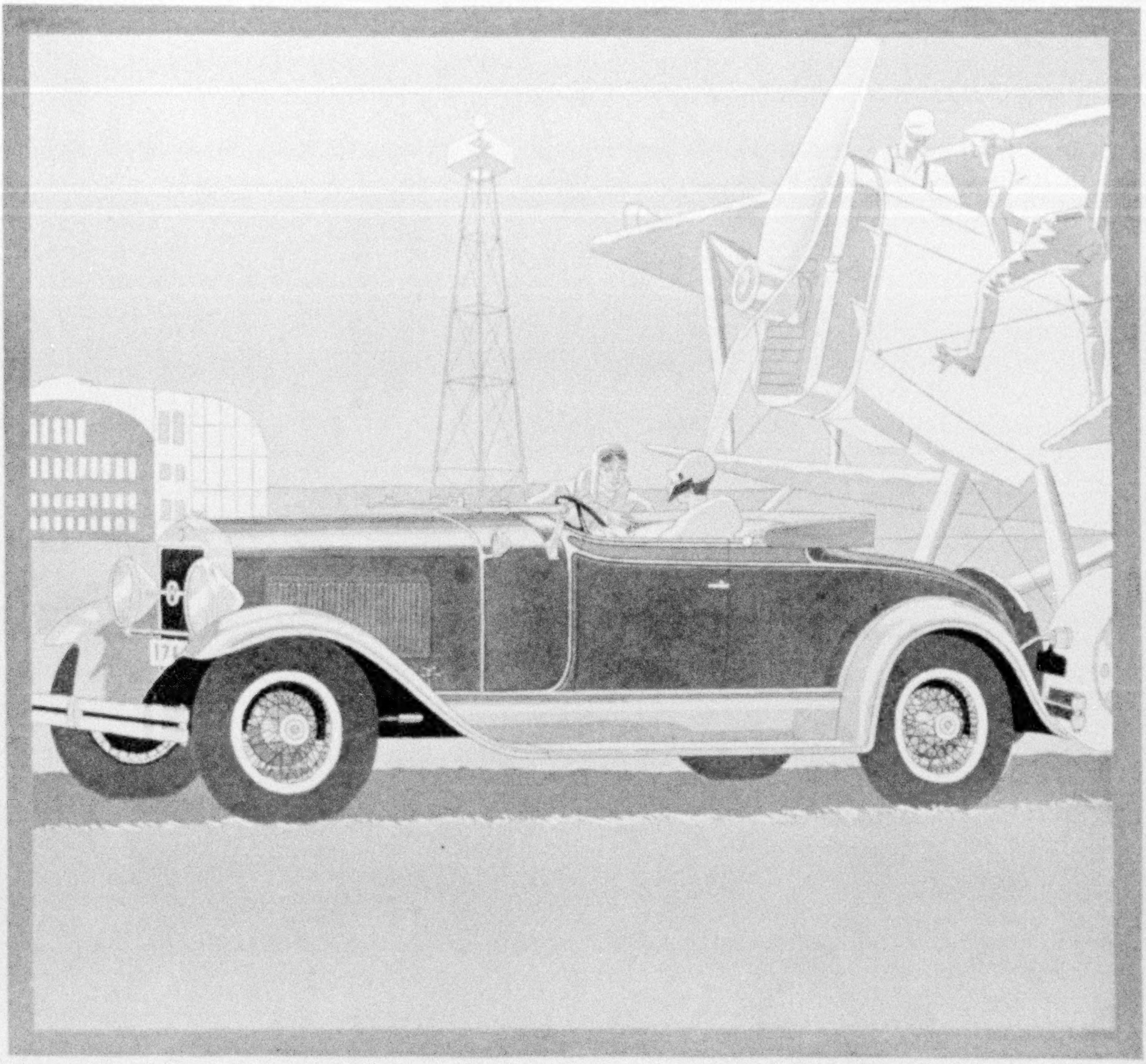
Gillette
TIRES AND TUBES



Studebaker President Eight Roadster, $1785. Commander Eight Regal Roadster, $1595. Commander Six Regal Roadster, $1450. On each, 5 wire wheels standard; roomy rumble seat. Commander Six Roadster, wood wheels—$1375. Prices at the factory. Bumpers and spare tire extra.

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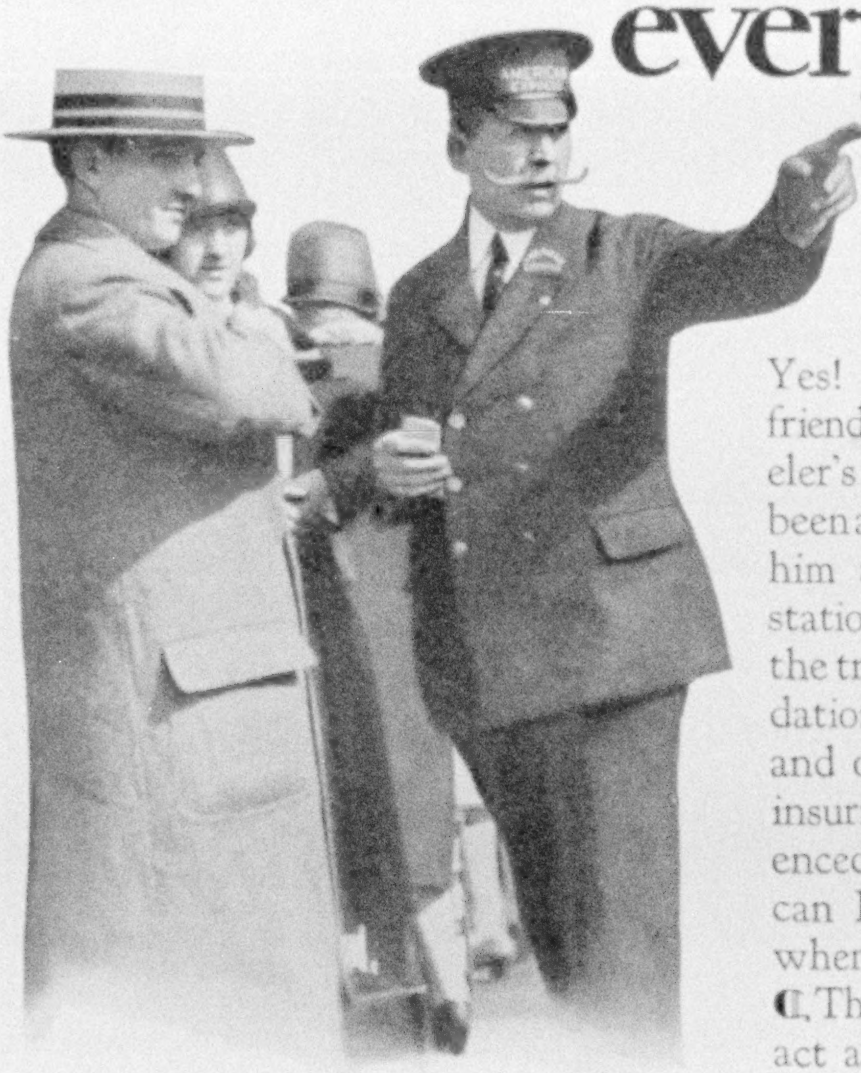
STUDEBAKER

Builder of Champions



The Friend of every traveler abroad

What? A friend abroad? Yes! *Your* friend if you go, your friend's friend—in fact, every traveler's friend. ℂ Ask those who have been abroad whether they have seen him at the docks, frontiers, and stations—arranging reservations on the trains, securing hotel accommodations, smoothing out passport and other difficulties which seem insurmountable to the inexperienced. Ask them what the American Express man means to them when they are in foreign countries. ℂ These uniformed representatives act as service units of the world-wide American Express organization to assist those who carry American Express Travelers Cheques. For almost two generations these sky-blue funds have safeguarded money against theft or loss and are spendable everywhere. ℂ An introduction? You need none, for your wallet of American Express Travelers Cheques acts as an automatic introduction. *Issued in denominations of* $10, $20, $50 *and* $100. *Cost 75c for each* $100. ℂ Sold by 22,000 Banks, American Express and Railway Express Agencies. Merely ask for American Express Travelers Cheques—sky-blue in color.

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Because these new courses open a new door to growth and achievement for thousands of men.

Because these new courses put certain benefits within the reach of hundreds of thousands of men to whom these benefits were previously denied.

Who are these men? What are these benefits?

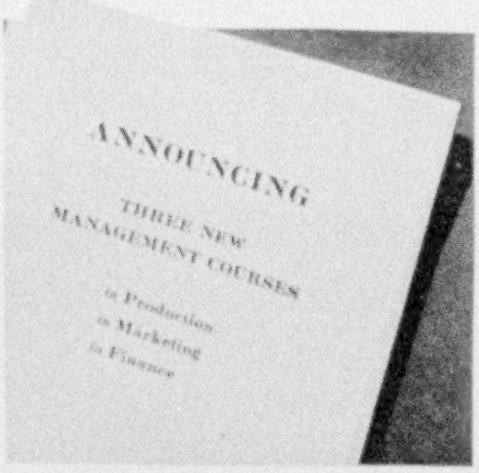
The men are numbered among those who have read the advertisements of the Alexander Hamilton Institute during the last twenty years. They are the men who realize the desirability of the Institute's training—who have often wished they had that training, but who haven't had time to take the complete Course and Service.

Now Three Shorter Courses

Heretofore, the Institute offered only its Modern Business Course and Service, a training similar to the comprehensive Business Courses at Harvard, the University of Pennsylvania, and New York University. More than 350,000 executives have enrolled for this Course; there is hardly a business organization of any size among whose executives there is not an Institute-trained man.

This major Course will be continued and constantly improved. It will always be *the great course* in executive training. But just recently the Institute made a notable step in advance. As the result of a growing need for more *specific* training, the research and educational staffs of the Institute have now developed three new *shorter* courses as follows:

1. A Special Course and Service in Production Management
2. A Special Course and Service in Marketing Management
3. A Special Course and Service in Finance Management



These courses, being shorter, do not require as much time. They deal primarily with the *special phases* of business in which a man is particularly interested. They are designed for *busy men.*

The value to executives of this enlarged program is admirably summed up in the words of Percy H. Johnston, president of the Chemical National Bank of New York, who considers it "the most significant step taken in business education in the past ten years."

What this announcement means to you

This announcement means that now you can get an Alexander Hamilton Institute Course *specially adapted to you and your work,* no matter what major department of business you are in—Production, Marketing, or Finance.

The length of time it takes to complete one of these Management Courses is considerably less than the two-year period for the Modern Business Course and Service; and naturally the fee for each is commensurately lower. All of the reading can be done in your spare time.

This booklet gives all the facts

We have prepared the booklet shown at the left, which describes these new courses in detail. We should like to circulate this booklet widely and to the following groups of men:

—*The heads of businesses* who recognize that the training of competent associates is their major problem.

—*Executives* interested especially in Production, Marketing, and Finance, who want to concentrate their efforts in one of these departments of business.

—*Younger men* who desire definite training in the management of the particular departments of business in which they are now engaged.

Send for the details

For convenience, a coupon is provided. We invite you to inform yourself on this great forward step in business education by mailing it at once.

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To the Alexander Hamilton Institute, 836 Astor Place, New York City.
Please send me all the facts about the Institute's new Management Courses.

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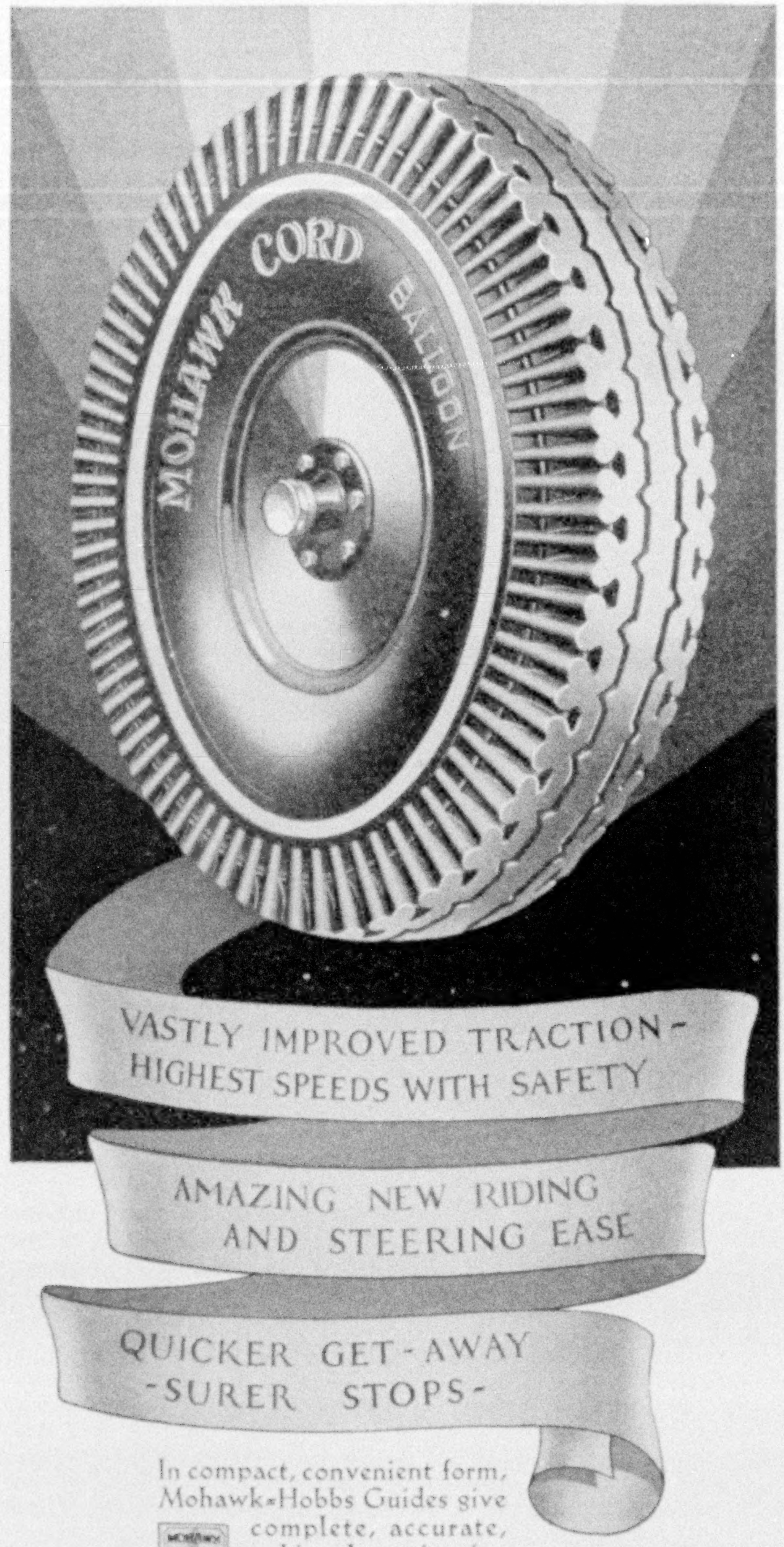
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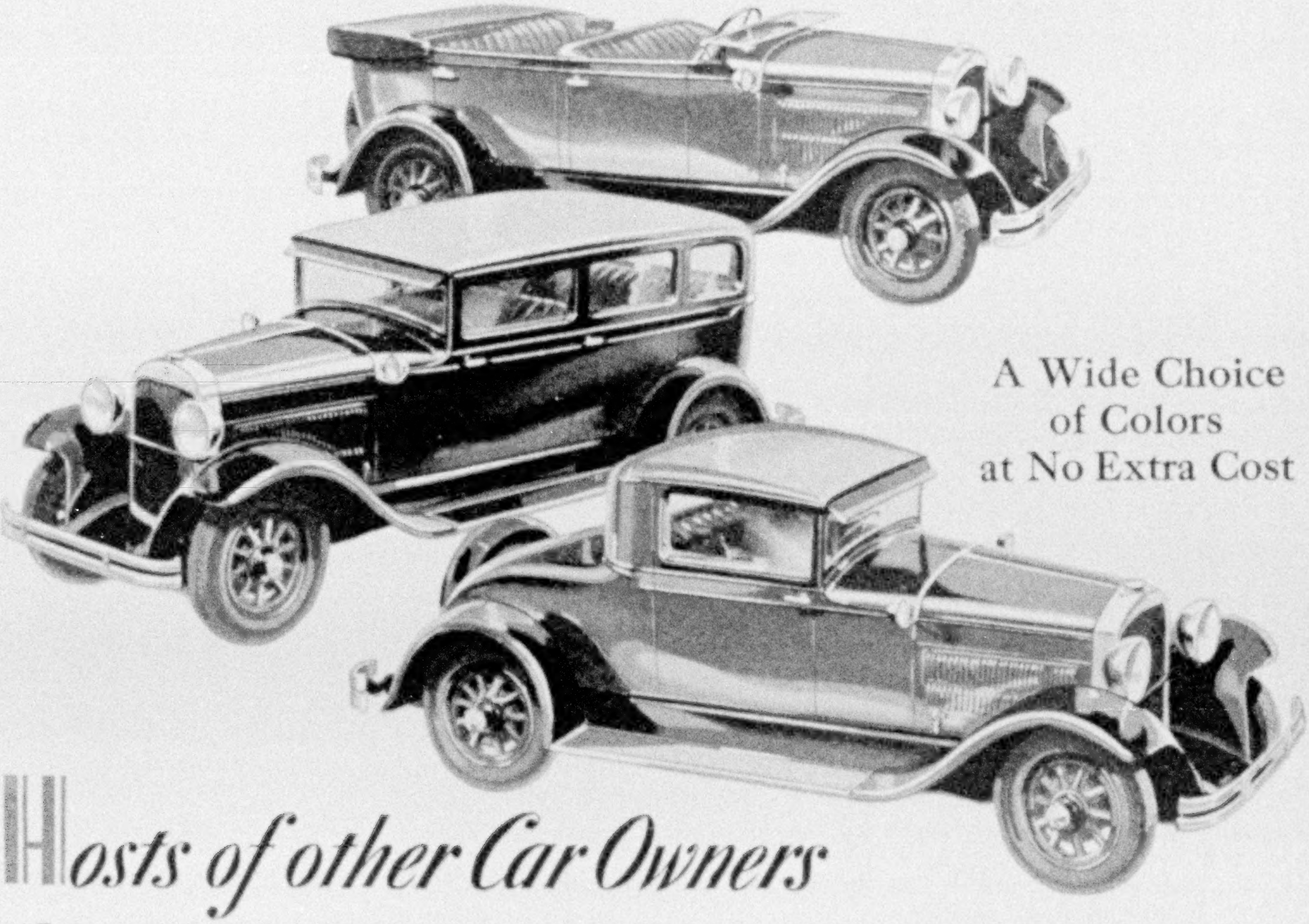

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Join the Big Swing to ESSEX

ESSEX the Challenger sweeps aside the barriers of price class. It challenges the performance, the style, the luxurious, roomy comfort of any car at any price, on the basis that no other car gives you back so much for every dollar you put in.

That is why the acceptance of Essex the Challenger is the talk of motordom. Join the van of 1,000,000 Super-Six owners who are demonstrating its right and ability to challenge the best that motordom offers.

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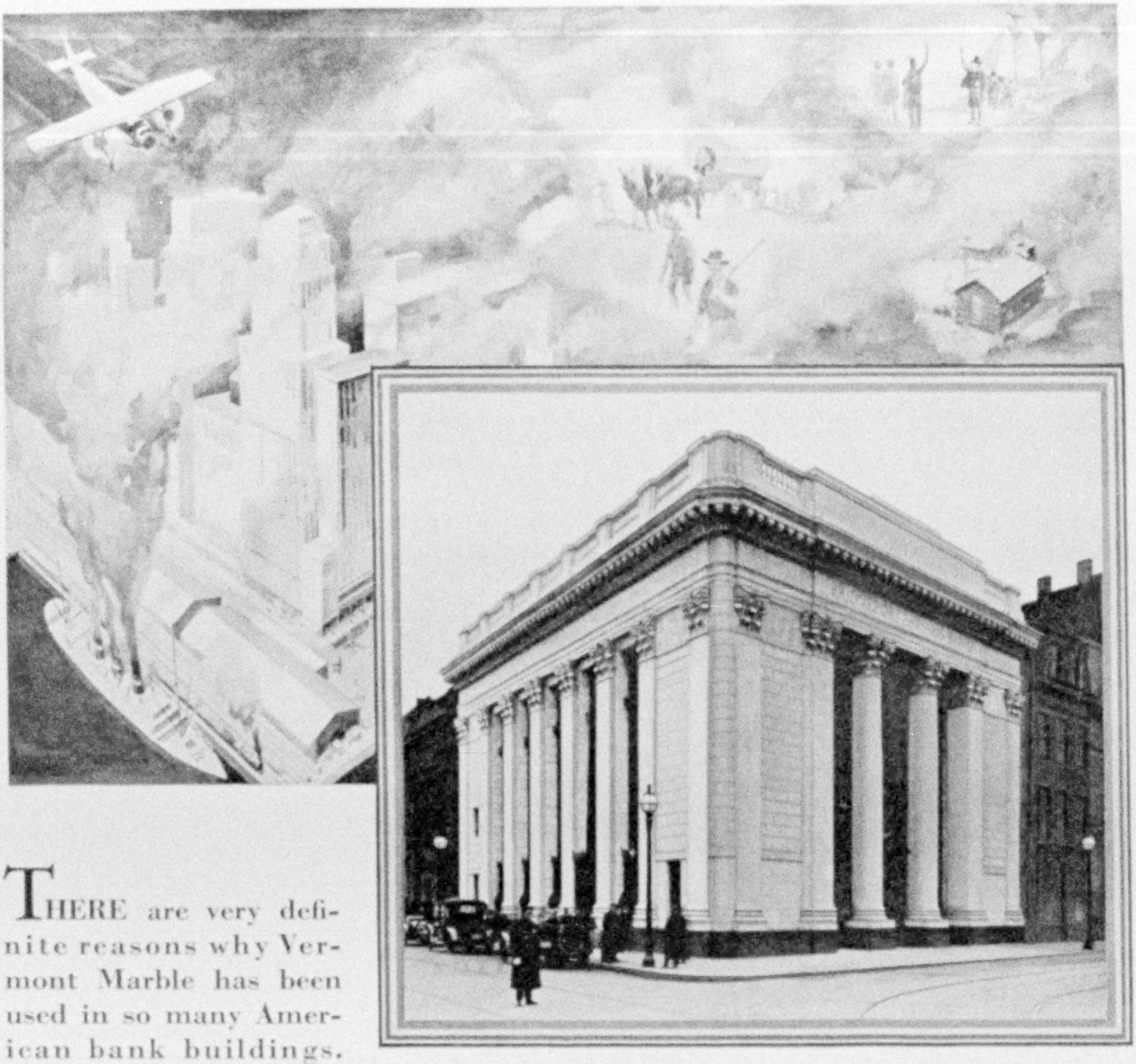
Standard Equipment includes: *4 hydraulic shock absorbers—electric gauge for gas and oil—radiator shutters—saddle lamps—windshield wiper—glareproof rear view mirror—electrolock—controls on steering wheel—all bright parts chromium-plated.*

ALL THAT IS BEAUTIFUL SHALL ABIDE FOREVER



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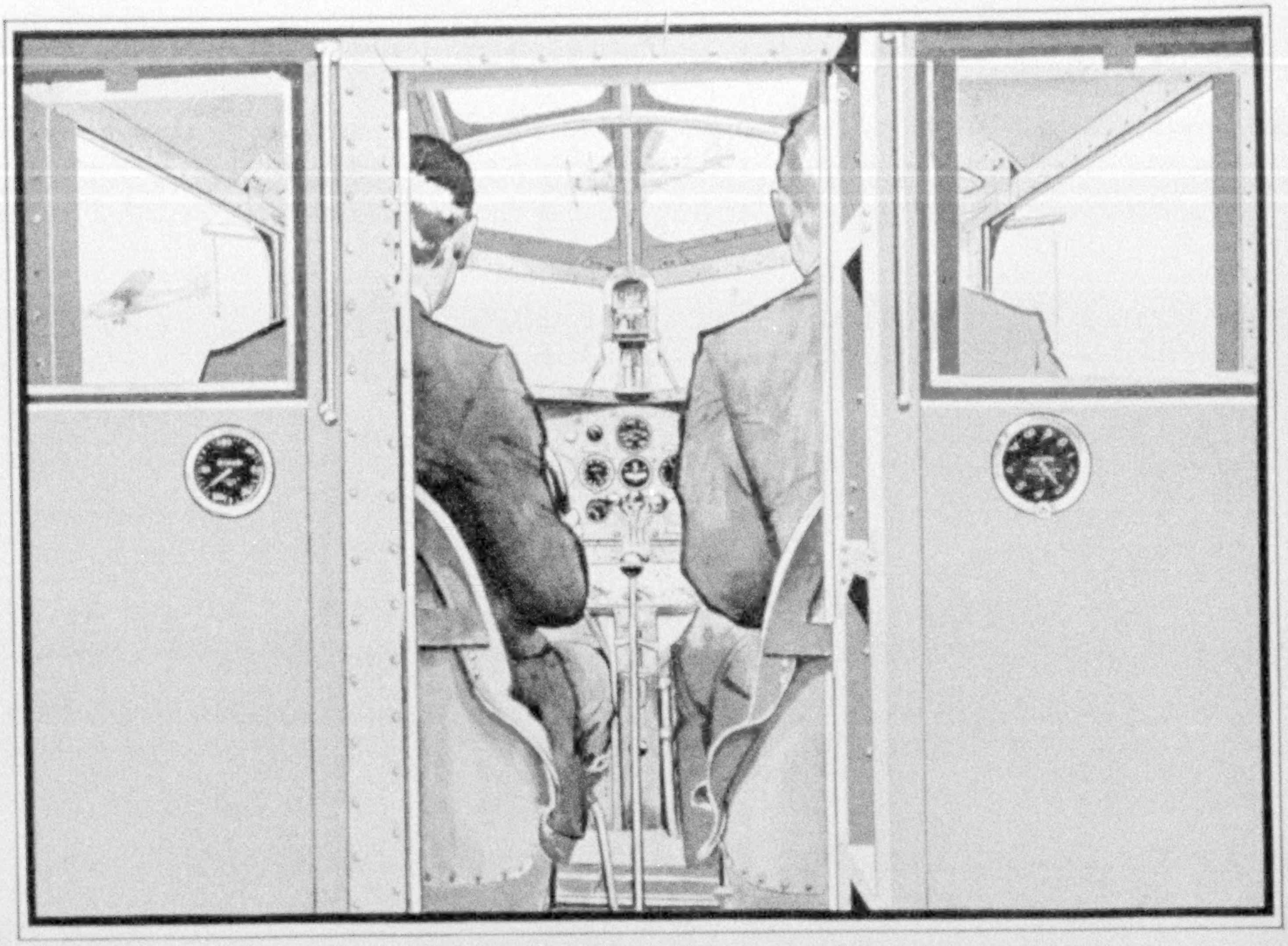


THE WAY OF EAGLES...

WHEN it's rough aloft . . . or the report says dirt above the Alleghenies . . . or ice and fog over the Hump . . . then only master pilots should take to the skyways! For these men who wing their way smoothly and safely across the illimitable vault of the heavens are not only pilots of extraordinary skill, but men of calm and clear-eyed judgment.

In the sudden surge of enthusiasm that is lifting everyone into the air, it's well to realize there is an ideal that must be recognized by all who hope to follow the example of those who command the highways of the sky. The master pilots . . . like the great sea captains . . . are truly a class apart. . . .

As factors of safety are multiplied in the design and construction of airplanes and engines, dependence on pilots will continue to lessen. . . . We know of runaway planes that have leaped into the air without human guidance at all and landed without cracking up! We know of war planes that made gentle landings, with dead sticks, and dead masters! We have actually flown in great tri-motored planes that held their course in fair weather without a man near the controls. *Nevertheless, in the hands of an incompetent, the plane is not a safe vehicle.*

In the early half of 1928, when the first burst of popular enthusiasm was being put into practical application, there was a sharp increase in air accidents . . . collisions, stalls, spins, slips, engine failures, overloading . . . due largely to the carelessness of inexperienced or incompetent amateurs.

Contrasting with over-eager amateurs, we have the experience of master pilots to prove the safety of sane flight. Collins, for instance, who has flown the Air Mail for well over half a million miles in seven and a half years! Dyer, of the Navy, who spent 1215 hours in the air in 1928 without an accident of any sort . . . close to two unbroken months of nights and days aloft in wind and storm and clear without accident! Mamer, former Army pilot, who carried 12,000 passengers in 4000 hours of flight, over earthquake ravaged regions, over forest fires, through blizzards! . . .

And Ford pilots, flying from Detroit to Cleveland, Chicago and Buffalo, who have flown over a million miles in a total of 518 days and nights of unbroken flight, with better than railroad efficiency and safety.

The best pilots in America today are those who have completed the courses given by the Army and Navy flying schools. These courses require 300 hours of every sort of flying, following thorough ground courses, and rigorous physical examinations.

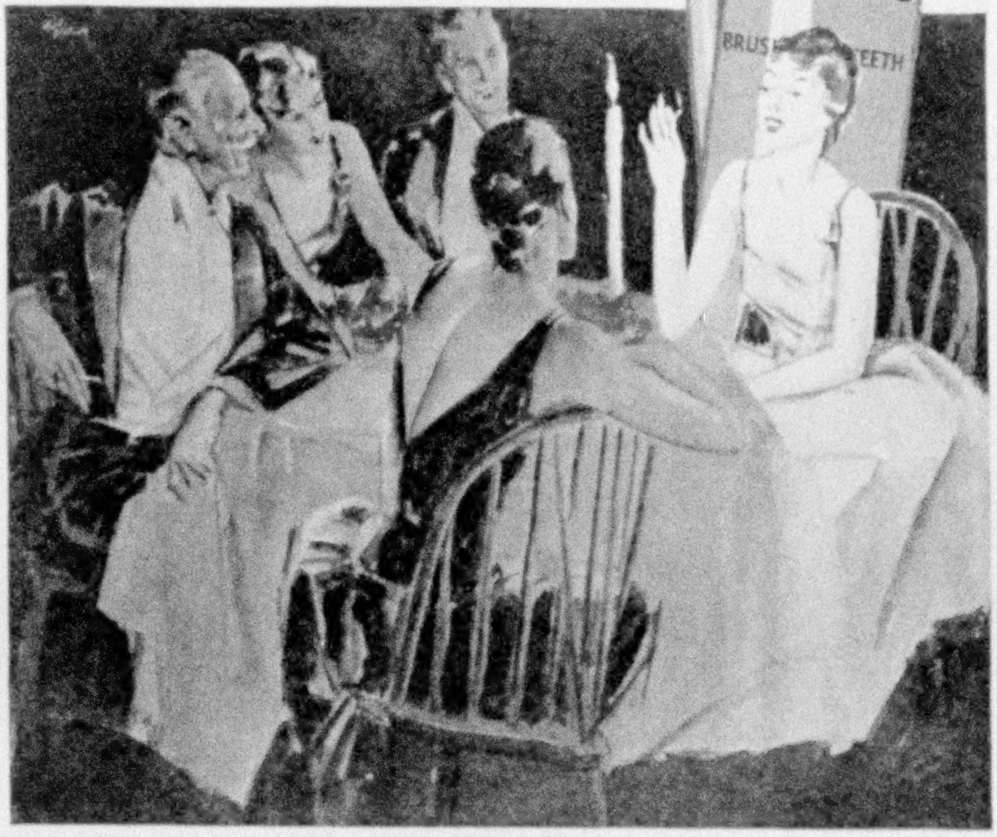
Ford requires its pilots to have hundreds of hours of solo experience, with a brilliant individual record proving mastery of the air! While Ford pilots are not in command of all the Ford tri-motored all-metal planes that are flying in commercial service outside of Ford-Stout operations, the magnificent record of all proves the importance to commerce and industry of properly designed planes, flown by master pilots.

FORD MOTOR COMPANY

White Teeth *deceive 4 out of 5* NOBODY'S IMMUNE*

Forhan's
TRADE MARK
FOR THE GUMS

** The Disease-of-Neglect Ignores Teeth, Attacks Gums—and Health is Sacrificed*



As your dentist will tell you, the daily brushing of teeth is not enough. For there's a grim foe that ignores the teeth, even the whitest teeth, and launches a severe attack on neglected gums. It ravages health. It often causes teeth to loosen in their sockets and fall out. And it takes as its victims 4 persons out of 5 after forty and thousands younger. It is Pyorrhea.

Don't let white teeth deceive you into thinking that all is well. Provide protection now. It is easier than relief. For when diseases of the gums are once contracted only expert dental treatment can stem their advance.

Have your dentist examine teeth and gums thoroughly at least once every six months. And when you brush your teeth, brush gums vigorously. For additional prophylaxis use the dentifrice made for the teeth and gums as well . . . Forhan's for the Gums.

Once you start using Forhan's regularly, morning and night, you'll quickly note a distinct improvement in the condition of your gums. They'll look sounder, pinker. They'll feel firmer.

As you know, Pyorrhea and other diseases seldom attack healthy gums.

In addition, the way Forhan's cleans teeth and safeguards them from decay will delight you.

Don't wait until too late. To insure the coming years against disease, start using Forhan's regularly. Get a tube from your druggist. Two sizes, 35c and 60c. Forhan Company, New York.

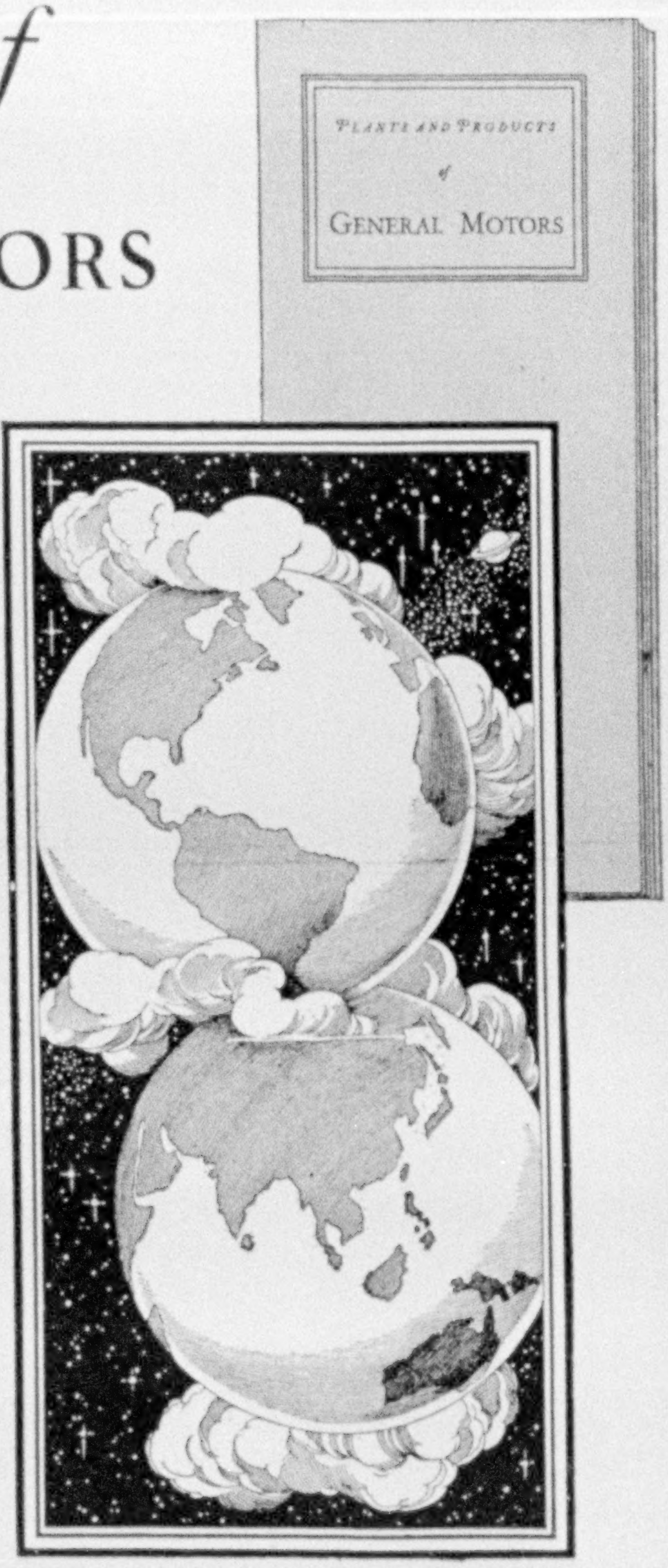
Forhan's for the Gums is more than an ordinary toothpaste. It is the formula of R. J. Forhan, D. D. S. It is compounded with Forhan's Pyorrhea Liquid used by dentists everywhere. You will find this dentifrice especially effective as a gum massage if the directions that come with each tube are followed closely. It's good for the teeth. It's good for the gums.

Forhan's *for the gums*

YOUR TEETH ARE ONLY AS HEALTHY AS YOUR GUMS

Plants and Products of

GENERAL MOTORS



STOCKHOLDERS of General Motors should be informed with regard to the constituent parts of the Corporation, including the extent of its interests in and control of other companies.

A complete list of the divisions that make up General Motors and how the Corporation coordinates its subsidiary and affiliated companies will be found in a booklet entitled "Plants and Products of General Motors."

A copy of this booklet will be mailed free upon request to Department K-6, General Motors Corporation, Broadway at 57th Street, New York.

"A car for every purse and purpose"
CHEVROLET · PONTIAC · OLDSMOBILE
MARQUETTE · OAKLAND · VIKING · BUICK
LaSALLE · CADILLAC · *All with Body by Fisher*
GENERAL MOTORS TRUCKS
YELLOW CABS *and* COACHES
FRIGIDAIRE—*The Automatic Refrigerator*
DELCO-LIGHT *Electric Power and Light Plants*
DP *Water Systems* · GMAC *Plan of Credit Purchase*

May we take you this summer?

for discriminating travelers

HARVEYCAR MOTOR CRUISES

hold the key to the carefree enjoyment of the Southwest frontier wonderland

A day - a week or a month

TRAINED couriers—hostesses as well as guides accompany every car. Complete comfort without thought for detail. Specially equipped cruisers are used and limited to four guests to a single car.

The Santa Fe-Harvey Company Courier Service is unique in the Travel world—a delightful feature of Harveycar Motor Cruises and The Indian-detour.

Daily Santa Fe SummerXcursions to the Far West

clip and mail coupon

Santa Fe

Harveycars

Santa Fe-Harvey Co., 957-A, Santa Fé, New Mexico
Please send me Harveycar Motor Cruise booklet and map.

. . . Your choice is both Simple and Sure

Not for a moment need the mind of any householder be confused as to the most satisfactory electric refrigerator. The answer is: the new reliable Kelvinator.

Kelvinator, the pioneer of successful electric refrigeration, welcomes the obligation which that pioneering implies.

It may seem a great deal to say that you cannot elsewhere equal Kelvinator's faithful performance. Yet Kelvinator's longer experience, its greater knowledge, its superior manufacturing methods and materials—all dedicated to the ideal of greater service—make good the promise.

It is precisely this state of affairs which makes your choice of electric refrigeration so simple and so sure—why thousands upon thousands are being added yearly to the greatest single group of satisfied users of electric refrigeration—the owners of the reliable Kelvinator.

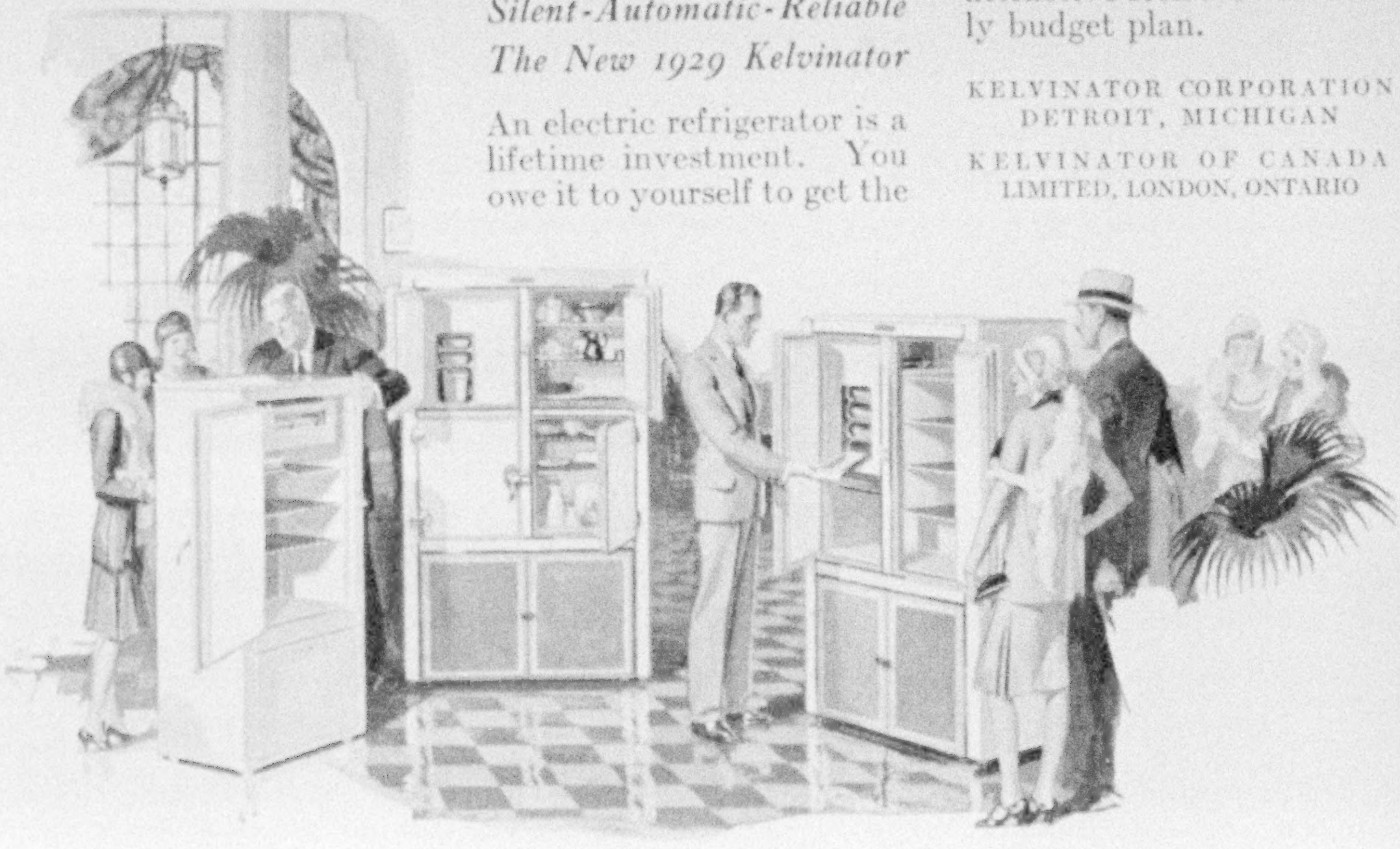
⁂

Silent-Automatic-Reliable
The New 1929 Kelvinator

An electric refrigerator is a lifetime investment. You owe it to yourself to get the highest quality at the lowest price. See the new 1929 Kelvinator before you decide. The widest choice of beautiful cabinets. Superiorities include the utter reliability which is peculiarly Kelvinator; new silence; positive and permanent; operation and temperatures wholly automatic and adequate to both freezing and preservation purposes. Ice cubes, frozen in flexible rubber trays, are removed instantly. Enjoy Kelvinator benefits without waiting, through Kelvinator's attractive ReDisCo monthly budget plan.

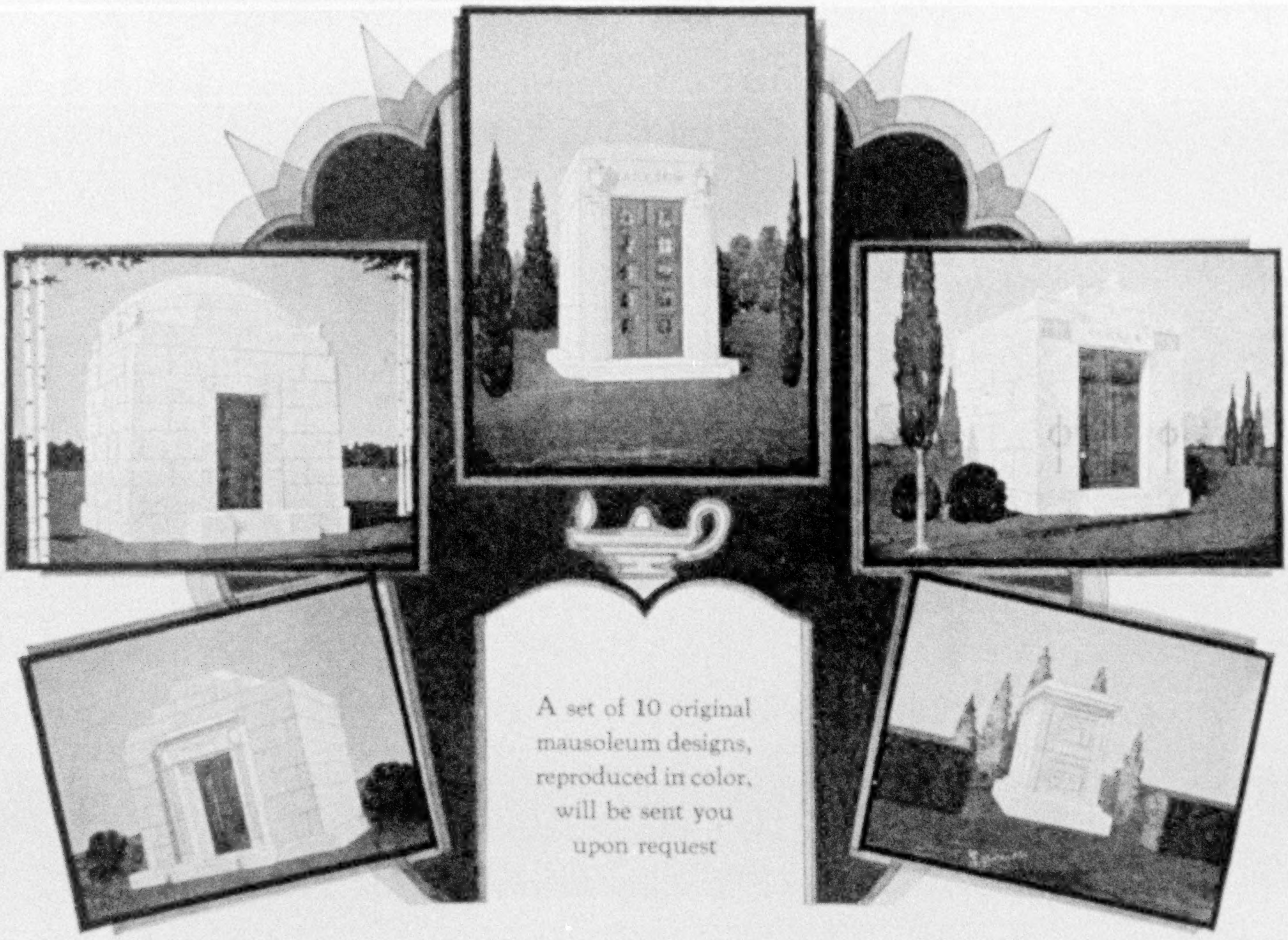
KELVINATOR CORPORATION
DETROIT, MICHIGAN

KELVINATOR OF CANADA
LIMITED, LONDON, ONTARIO



THE RELIABLE
KELVINATOR

MAVSOLEVMS
IN MODERN TREATMENT



A set of 10 original mausoleum designs, reproduced in color, will be sent you upon request

A SERIES BY TWO LEADING MEMORIAL ARCHITECTS

ARTEMISIA, wife of King Mausolus of Caria, so lamented his death in 353 B.C., that she commissioned Satyrus and Pythius, Greece's leading architects, to perpetuate his memory in a superb memorial. Its beauty so impressed the invading Romans that they gave the name "Mausoleum" to their memorials which approached that of Mausolus in size and grandeur.

The Georgia Marble Company has commissioned two of America's leading memorial architects to create outstanding designs for you. These designs show the classic motifs in modern treatment, and range in size from two to twelve catacombs. Erected in durable Georgia Marble they will retain their original beauty for centuries. If interested in this type of memorials, clip the coupon below and mail today to

THE GEORGIA MARBLE CO., Tate, Ga.
Please send me the set of suggested designs for Georgia Marble mausoleums.

Name ____________________

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THE GEORGIA
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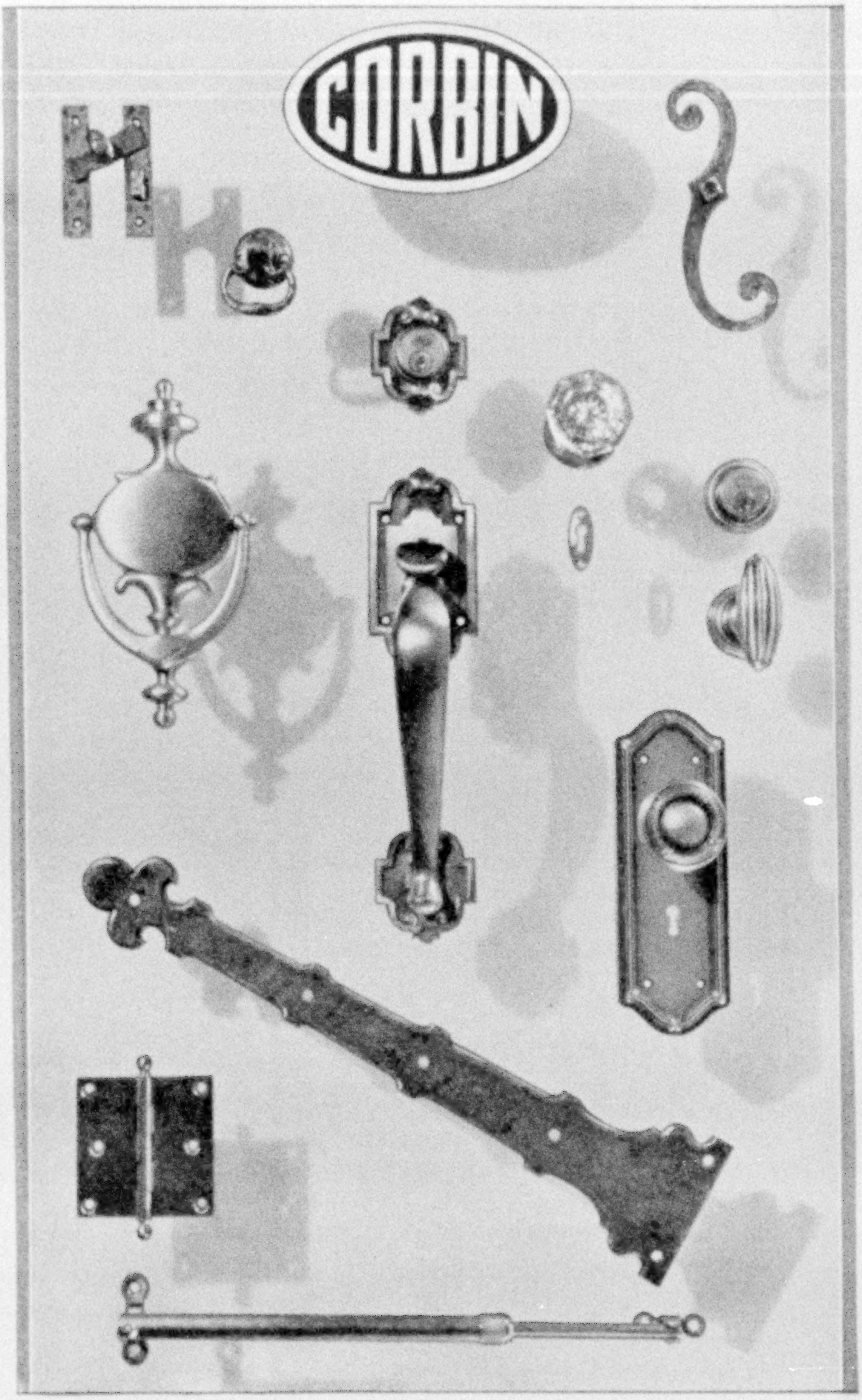


Varied in kind . . . alike in obligation

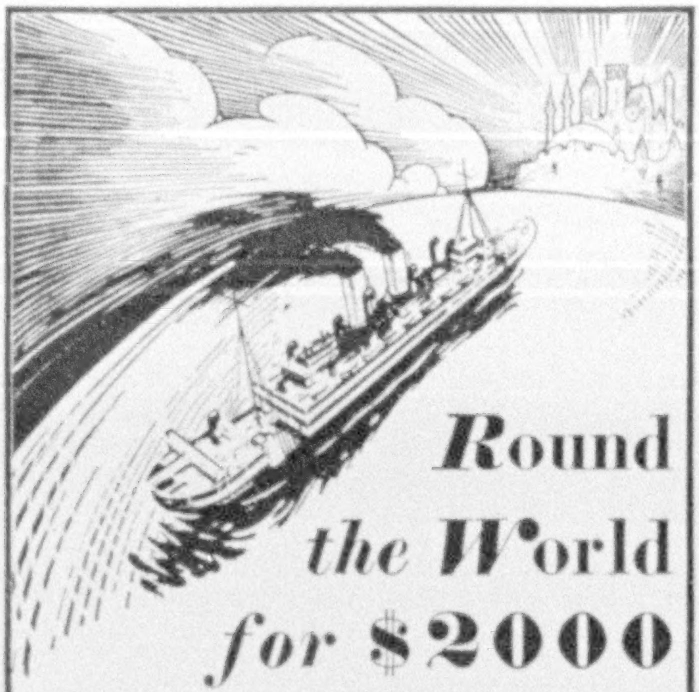
FROM tiny catch to massive hinge, from push button plate to door-check—all are at your service in Good Hardware–Corbin.

Remember, the catch on a cellar window may be as important as the lock on an entrance door. The smallest bolt may stand between you and the loss of valuable property. And remember that Corbin makes *all* these items—every one of them Good Hardware–Corbin.

The same excellence that has made "Corbin" mean so much on fine locks and door-checks, applies to the smallest of the thousands of articles made by Corbin for every hardware need. Be it for attic or front door, kitchen cupboard or casement window—Good Hardware–Corbin—is strong, dependable, easy-working, correct.

If you are thinking of building in the near or distant future, you would enjoy looking over "Good Buildings Deserve Good Hardware." This very unusual booklet on hardware for every need is free. Write Dept. N-6 for a copy.

P. & F. CORBIN SINCE 1849 NEW BRITAIN CONNECTICUT
The American Hardware Corporation, Successor
New York Chicago Philadelphia



Round the World for $2000

On the largest, fastest and most luxurious liner that has ever sailed around the globe

RAYMOND-WHITCOMB
ROUND THE WORLD CRUISE

IN TIME—the shortest round the world cruise . . . for the superior speed of the cruise-ship cuts down the time at sea.

IN ROUTE—unusually complete . . . visiting all the recognized world cruise points in Europe, Africa and the Far East, and such rarely visited places as *Formosa, Bangkok,* capital of Siam, *Seoul,* capital of Korea . . . Eleven days in *India* with extended trips into the interior. Ten days in *Japan* at the Cherry Blossom season. Eight days in *China* with a trip to *Peking.*

Sailing January 21, 1930, on the S. S. "Columbus," and returning on May 6

There are accommodations for 230 passengers at prices ranging from $2000 to $3500; suites and rooms with baths at higher prices

Send for the Booklet—"ROUND THE WORLD CRUISE"

South America Cruise

An unusual cruise, completely encircling South America. Sailing on February 1, 1930 . . . on the S. S. "Samaria," for a two-month's voyage during the southern summer.

Land Cruises in America

On special trains built for Raymond-Whitcomb that are unequalled in comfort. Summer trips of unequalled completeness to California, Alaska, Hawaiian Islands, the Canadian Rockies, and the great National Parks.

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126 Newbury Street, Boston, Mass.
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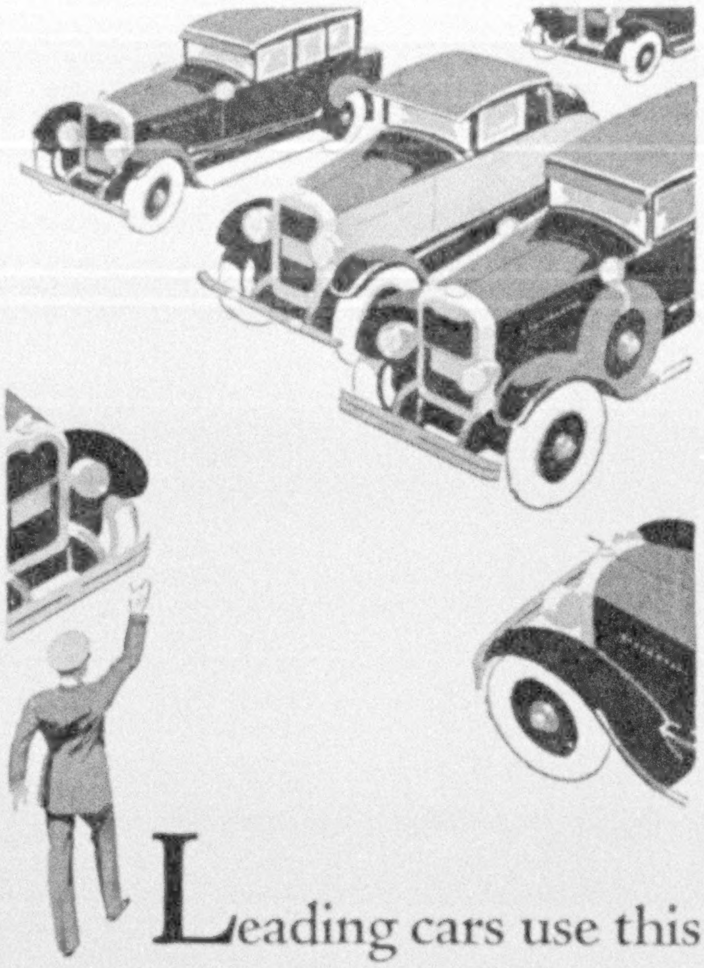
Chicago, 176 N. Michigan Ave.; *Detroit,* 421 Book Bldg.
Los Angeles, 423 West Fifth St.; *San Francisco,* 230 Post St.
Agents in the principal cities



Leading cars use this Quiet NEW Brake Lining

Johns-Manville Moulded offers every car owner an end to screaming brakes

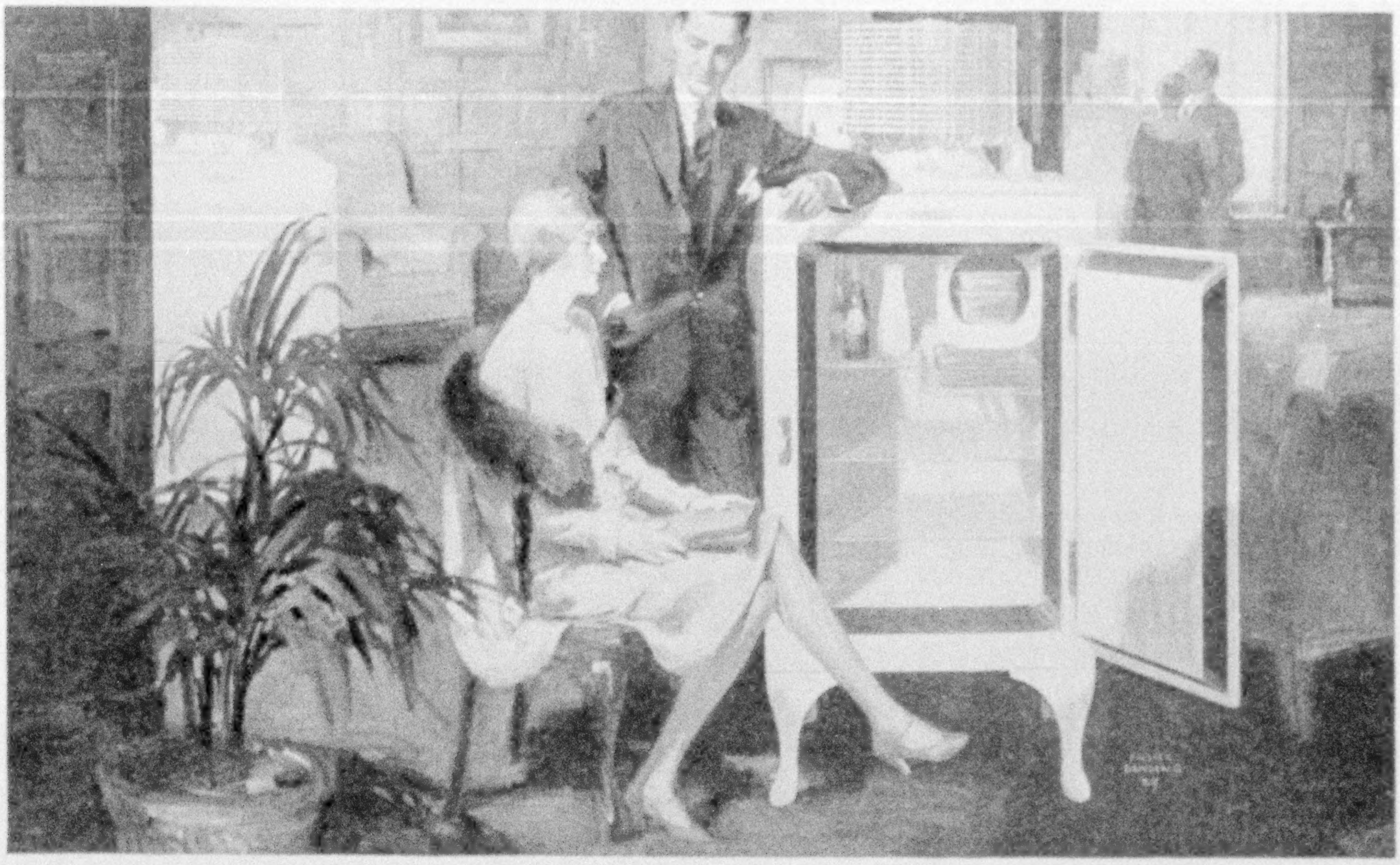
It was not alone the fact that J-M Moulded Brake Lining ends screeching, noisy brakes that caused it to be chosen as factory equipment by seven famous car builders. Besides its quietness in action, J-M Moulded takes hold with a new smoothness — never grabbing, gently gripping yet with mighty force this new Johns-Manville Brake Lining will stop cars more safely, and go on doing so for more months, than was ever thought possible.

Leading cars—over a million of them—will be factory equipped with J-M Moulded during the next year. You can easily modernize your own brakes. J-M Moulded is now available for 150 cars and trucks, made by 41 manufacturers. Order it installed in your car at the first sign of worn lining. You will probably never have to buy any more brake lining while you drive the car.

Johns-Manville Moulded takes hold with a sure, safe grip for tens of thousands of stops.

MOULDED TO FIT **Johns-Manville**
MOULDED BRAKE LINING

Johns-Mansville Asbestos Brake Lining, for years famous for its safety and long life, continues to be available for all cars.



More than a quarter of a million users

and they haven't spent a single dollar for service

Two years ago this month the General Electric Refrigerator was first publicly announced. Everywhere you heard it said that General Electric had completely revolutionized the art of refrigeration.

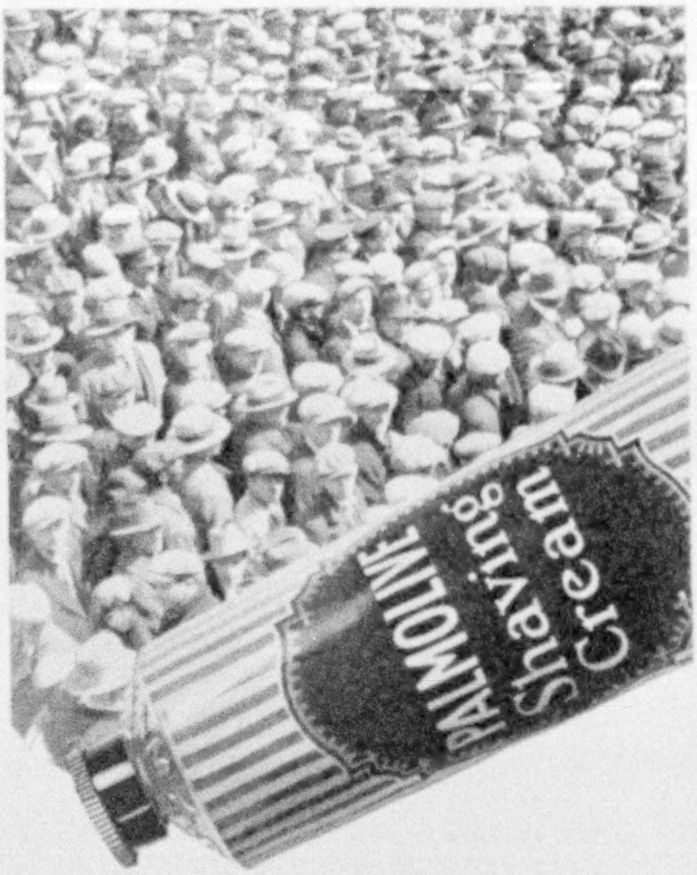
Fifteen years of research and development had produced a refrigerator with an hermetically sealed, dust-proof mechanism, mounted on top . . . a refrigerator with an improved type of cabinet, mounted on legs . . . one with an accessible temperature control . . . that established a new standard of quiet operation . . . that required no oiling . . . that dispensed with all troublesome machinery . . . that banished installation problems . . . that eliminated all radio interference . . . that provided greater food storage.

Today more than a quarter of a million homes are enjoying the exclusive innovations which only the General Electric Refrigerator offers. And not one of these owners has ever paid a dollar for service . . . that was our guarantee to them!

Now the cabinet is all-steel! It cannot warp. It is as strong as a safe. This remarkable cabinet and the hermetically sealed mechanism make the most perfect refrigerator that has ever been built . . . the greatest value you can buy. The small family model sells for $215 at the factory. For descriptive booklet address Section R-6, Electric Refrigeration Dept. of General Electric Company, Hanna Bldg., Cleveland, Ohio.

GENERAL ELECTRIC

ALL-STEEL REFRIGERATOR



We have Sent

3,000,000 men this free 7-day tube

86% of those who try it discard old methods. Will you send the coupon for your test? It's free.

GENTLEMEN: Some time ago we asked 1,000 men to advise us in creating a new shaving preparation—Palmolive Shaving Cream. They told us 5 important ways old methods failed to please. After much experimenting we've finally succeeded—and millions of men have acclaimed the cream we make.

1: Multiplies itself in lather 250 times.
2: Softens the beard in one minute.
3: Maintains its creamy fullness for 10 minutes on the face.
4: Strong bubbles hold the hairs erect for cutting.
5: Fine after-effects due to palm and olive oil content.

Our free test offer

Probably you will find we have anticipated your desires in our unique new cream. So we ask you, in fairness to yourself—and to us who have tried to please you—to mail the coupon now. A generous 7-day test will come to you by return mail. Act now.

To add the final touch to shaving luxury we have created Palmolive After Shaving Talc—especially for men. Try the sample we are sending free with the tube of Shaving Cream.

PALMOLIVE RADIO HOUR—Broadcast every Wednesday night—from 9:30 to 10:30 p.m., eastern time; 8:30 to 9:30 p.m., central time; 7:30 to 8:30 p.m., mountain time; 6:30 to 7:30 p.m., Pacific Coast time — over station WEAF and 37 stations associated with The National Broadcasting Company.

7 SHAVES FREE

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Palmolive Dept. B-3071, 595 Fifth Avenue, New York City.
In Canada, address Palmolive, Toronto 8, Ont.

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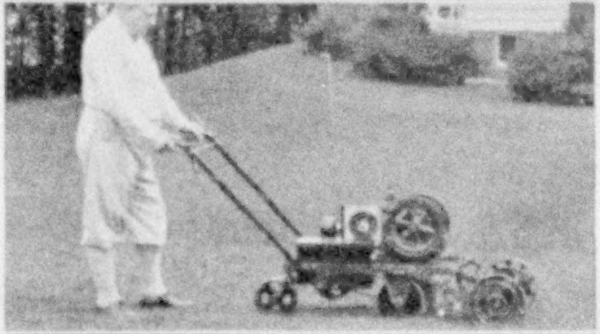
(Please print your name and address)

IRON FENCE MODERNIZED

Send for "Good Taste in Good Fencing," which illustrates today's vogue in staunch, iron fence. Stewart Fences protect, beautify and enhance property. They keep children safe and sound.

Stewart

THE STEWART IRON WORKS CO., Inc.
Established 1886
524 Stewart Block, Cincinnati, Ohio



Saving labor costs— building better lawns

IDEAL Power Lawn Mowers mean low repair bills. 2 sizes roller type and 2 sizes wheel type. They cut close up to shrubs, trees, etc., slow down for corners—make a cleaner cutting job from first to last.

Send now for full particulars and prices on these practical power lawn mowers that mean better lawns.

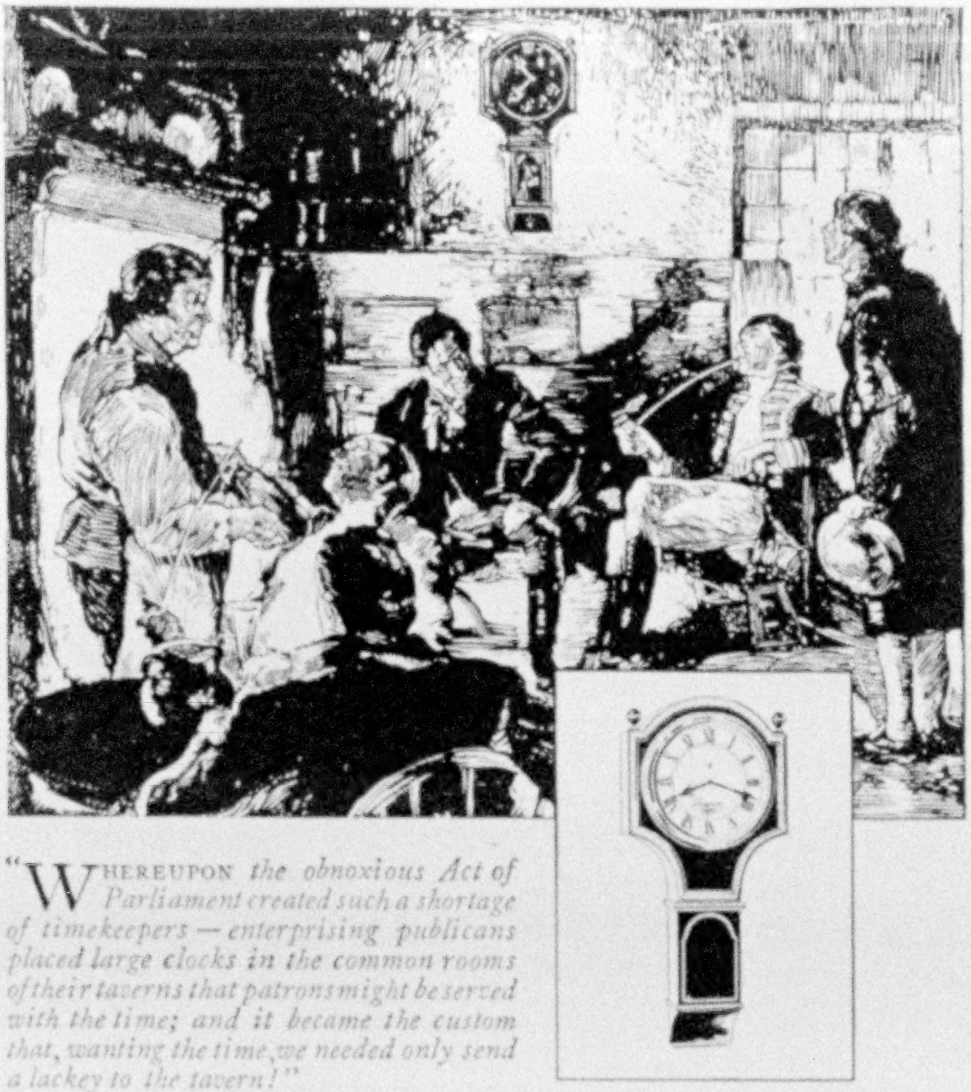
Ideal Power Lawn Mower Company
422 Kalamazoo Street, Lansing, Michigan

Branches:
New York Chicago Detroit

Dealers in All Principal Cities

IDEAL POWER LAWN MOWERS

. . to the Tavern to get the Time . .

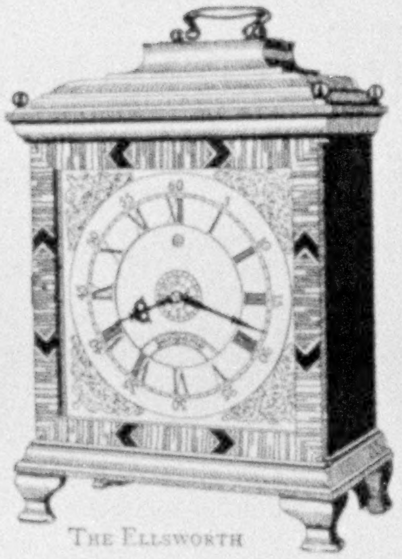


Had you lived in England in 1797, you would have had to pay a five-shilling tax on each clock or watch you owned. Clocks at that time were a luxury which only the rich could afford. Hence the tax on all timepieces.

The now-famous Act of Parliament, passed in 1797, is as follows:

"ORDAINING *that—for and upon every clock or timekeeper, by whatever name the same shall be called, which shall be used for the purpose of a clock and placed in or upon any dwelling house, there shall be charged an annual duty of 5 shillings.*"

"WHEREUPON *the obnoxious Act of Parliament created such a shortage of timekeepers — enterprising publicans placed large clocks in the common rooms of their taverns that patrons might be served with the time; and it became the custom that, wanting the time, we needed only send a lackey to the tavern!*"



THE ELLSWORTH

A period design case by Erskine-Danforth *$175.00*

IT is a far cry from those old-fashioned clocks to the most modern of all clocks—the Sangamo Electric. People no longer go to the tavern "to get the time." They have clocks in their homes that rival for accuracy the most costly jeweled railroad watches; clocks that operate from an electric socket; clocks they never need to wind.

Current variations do not affect the timekeeping qualities of a Sangamo. Even a blown fuse does not interrupt its ticking. A tiny motor built into the Sangamo faithfully and uniformly winds the mainspring—noiselessly, automatically, continuously. Sangamo is essentially different from all other clocks—electric or otherwise.

So modern, so beautiful, so accurate, so reasonable in price, is the Sangamo Electric Clock that it is revolutionizing the clock industry. Only recently has the output begun to catch up with the increasing demand. America, Canada, England . . . even far-off Switzerland is buying Sangamos in steadily increasing numbers.

* * *

Sangamos come in period designs; in 45 styles; in rich woods, in bronze, in leather; charming color designs which harmonize with any room in any modern home. Melodious two-toned strikes on many models record hours and half-hours with a musical note.

A beautiful Sangamo Electric can be purchased for $25, $35, $45, $55, strike or non-strike, as preferred. For those who choose to own the most luxurious cases, there are Sangamos up to $400.

"Telling Time," an interesting book on clocks, showing reproductions of the Sangamo *Act of Parliament* Clock and many other famous old masterpieces, as well as the latest styles in clocks, will be sent to you on request.

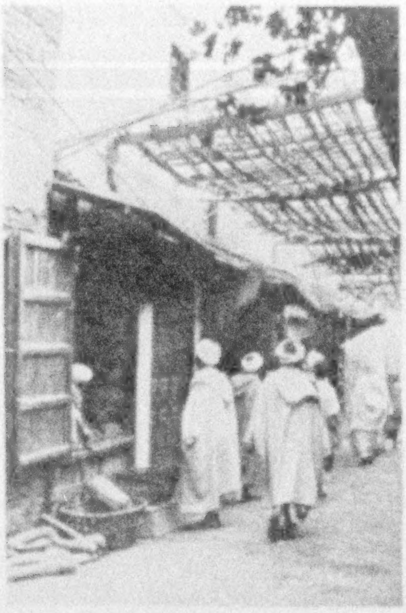
Many beautiful "Hamilton-Sangamos" cost as little as $25 and $35

HAMILTON-SANGAMO

ELECTRIC CLOCK

HAMILTON-SANGAMO CORPORATION, SPRINGFIELD, ILLINOIS

Homeric days



on the

Mediterranean

Cruise Supreme

from New York January 25th, 1930

A modern Odyssey on the "Ship of Splendor"—HOMERIC—the largest steamer to sail away from winter to the springtime Inland Sea. To *all* her usual ports she adds the historic Islands of Majorca, Malta, Corsica and Cyprus . . . and the interesting cities of Casablanca and Barcelona. From robed Berbers to the land of Pharaohs . . . twisting alleys to gay boulevards . . . from sombre cathedrals to carefree plazas. Algiers, Monaco, the Holy Land and a long stay in Egypt during the vibrant social season. Leisure days in Madeira. Greece, Turkey and Sicily . . . Naples and Gibraltar . . . returning via steamers Majestic, Olympic, etc. Generous stop-over privileges.

Altogether over 14,000 miles in 65 days on the seventh Mediterranean Cruise of the Homeric—known the world over for her luxury, generous accommodations and service.

Full particulars upon request

THOS. COOK & SON

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Philadelphia Boston Baltimore Washington Chicago St. Louis
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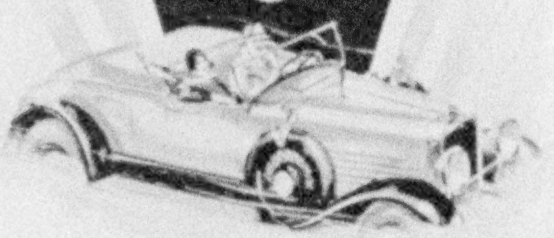
in co-operation with

WAGONS-LITS CO.

Let your tour be an adventure by day but play safe at night



Plan your trip so you will always stop at a recognized hotel—where high standards are maintained, where the food is appetizing, the rooms clean and comfortable—where risks are avoided and respectability is assured.

Where—
"Your hotel manager is never a stranger"

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The BANCROFT Worcester, Mass.
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The ALEXANDER HAMILTON Paterson, N. J.
The STACY-TRENT Trenton, N. J.
The PENN-HARRIS Harrisburg, Pa.
The TEN EYCK Albany, N. Y.
The ONONDAGA Syracuse, N. Y.
The ROCHESTER Rochester, N. Y.
The SENECA Rochester, N. Y.
The NIAGARA Niagara Falls, N. Y.
The LAWRENCE Erie, Pa.
The PORTAGE Akron, Ohio
The DURANT Flint, Michigan
The PRESIDENT Kansas City, Mo.
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KING EDWARD HOTEL Toronto
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(May to Sept. inclusive)
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BRITISH WEST INDIES

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(Opening season 1929-30)

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Land of Romance

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ANCIENT MOORISH TEMPLES . . . Magnificent "Castles in Spain" . . . land of Romance—Play . . . Wonder places where time has lent its graceful charm to enchant you!

Traveling in Spain is like a beautiful dream . . . the wonders of history parading before your eyes!

And you may live amidst this historical grandeur, this romance—in modern comfort—at moderate cost!

Visit the great "International Exposition of Barcelona" and see the greatest collection of art, science and industry of all times. Housed in buildings that took eight years to build and at a cost of $22,000,000. Spain has perfectly blended her own architecture, centuries old, with all that is beautiful in the "Moderne."

Spain—Barcelona—should be on your itinerary in 1929.

[Barcelona — Paris, 23 hours . . . London, 30 hours . . . Berlin, 39 hours. Motor Tours on 40,000 miles of hard surface roads! Rail transportation reduced.]

INTERNATIONAL EXPOSITION BARCELONA

May to December

1929

For further information address any Tourist Bureau, or M. Ventura, American Delegate,
113 West 57th Street · New York City

AROUND THE WORLD
On the Cunard Super-Cruising Steamer
FRANCONIA
Sailing From New York January 11 Next

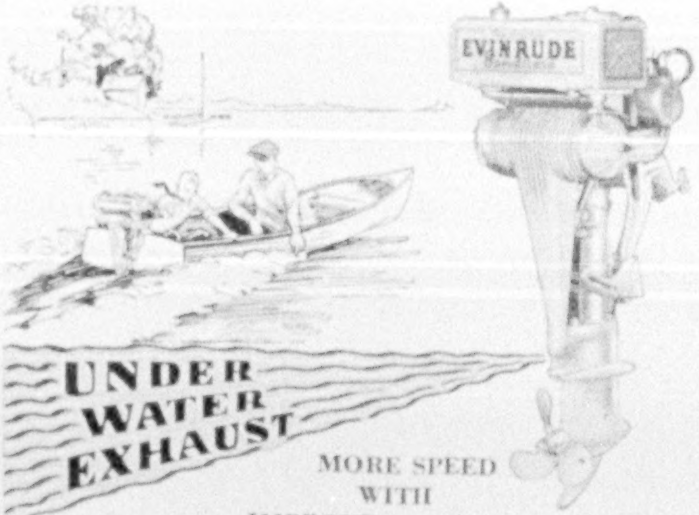
The Thrill of Striking Contrasts

The urge to see more . . . to know more . . . the great thrill of world conquest. The pride, the enchantment of discovery; to roam the bazaars and the fairs of strange exotic lands and capture their gay wares for your very own. Tiger-skins in India . . . star-sapphires in Ceylon . . . gold and silver thread sarongs in Java . . . in China, mandarin coats . . . precious jades in Korea . . . exquisite cloisonné in Japan.

A complete world panorama in 138 glorious, pleasure-packed days. Ports never before visited by any World Cruise . . . Amoy, Malacca, Pasuruan, Surabaya, in addition to the usual "beaten track" places. Perfection of detail for comfort, luxury and pleasure on land and sea made possible by the combining of two such world-famed travel exponents with their 177 years of experience.

Literature and full information from your local agent or

CUNARD LINE
or
THOS. COOK & SON



MORE SPEED
WITH
IMPROVED QUIETNESS

NOW, the high staccato tone of last year's quiet Evinrude Speeditwin and Fastwin is transformed into a low, pleasing drone. Burned gases are not only water-muffled, but also atomized, completely eliminating exhaust fumes.

The turning propeller and the water friction at the underwater outlet literally suck gases out of the motor, giving as much speed as if no muffling were used.

Four twin-cylinder models, 2½ to 20 H. P., from canoe to cruiser sizes. Easy time payments, as low as $37.50 down.

Write for new free Evinrude Year Book
EVINRUDE DIVISION, *Outboard Motors Corp.*
4305 27th Street Milwaukee, Wis.

EVINRUDE
3 to 45 Miles Per Hour

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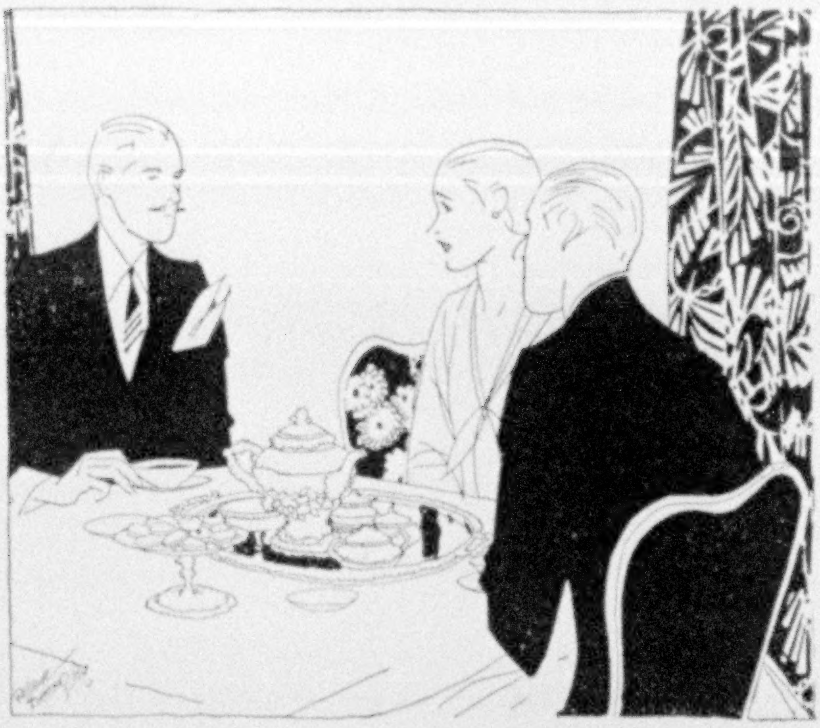

No one needs to give up the friendly cheer of coffee

So MANY people enjoy to the fullest their breakfast coffee—and yet strictly deny themselves its flavor and cheer at the evening meal. And all because ordinary coffee contains a drug that often upsets sleep.

If they only knew it—how unnecessary! For there's a coffee today that lets you sleep. A coffee with 97% of this drug caffeine removed. Kaffee Hag Coffee.

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Try Kellogg's★ Kaffee Hag Coffee. Wouldn't you like to feel that all the family can drink delicious coffee morning, noon and even at night, without harm? And what could be more welcome to the coffee lover who has been putting up with substitutes!

Kaffee Hag Coffee comes in sealed cans. Steel cut or in the bean. Sold by dealers everywhere. Served in hotels, restaurants, on diners. Let us send you a generous trial can. Mail the coupon.

COFFEE
KAFFEE HAG
THE COFFEE THAT LETS YOU SLEEP
STEEL CUT

KAFFEE HAG CORPORATION
1889 Davenport Ave., Cleveland, Ohio

Please send me, postpaid, enough Kaffee Hag to make ten cups of good coffee. I enclose ten cents (stamps or coin).

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Address________________________

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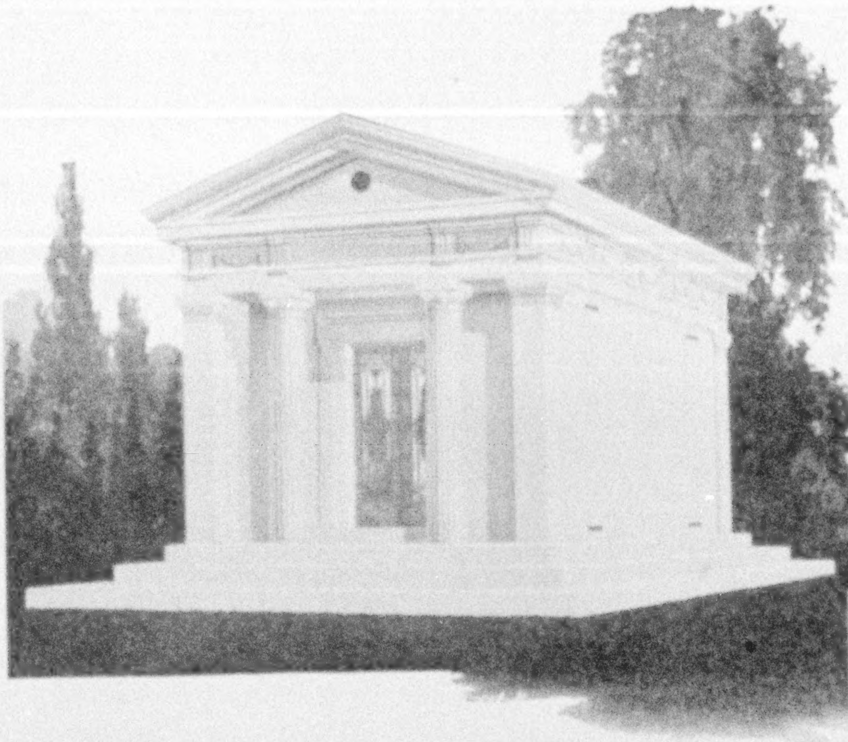
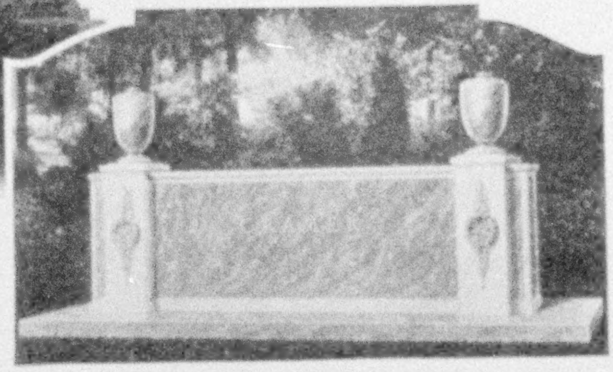
The coffee that lets you sleep



IF WE should forget those finer touches that only an artist can place in the design of a Memorial, then we neglect our sacred duty to those whom we commemorate.

Dodds' Memorials are created by a staff of artists, and the beauty thus originated is carried on into countless future generations through the medium of Nature's finest Memorial Granites from the Dodds' Quarries of New England.

In our profusely illustrated book, "Modern Memorial Art," is a wealth of helpful suggestions. Write for your copy.



Above: The chaste refinement of Grecian Architecture finds a place in this substantial family Mausoleum.

At right: This illustration cannot do justice to the rich veining and blended color of Stony Creek Granite.

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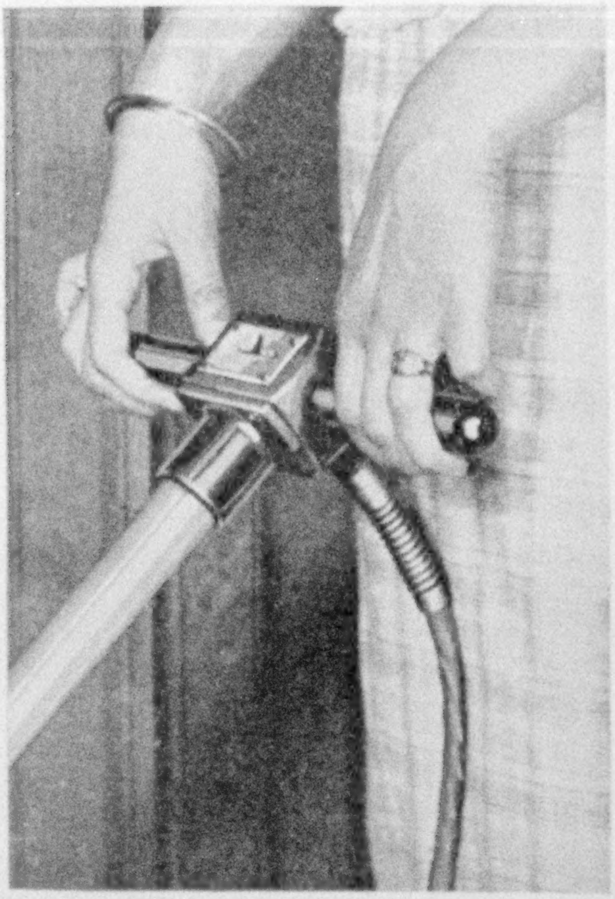
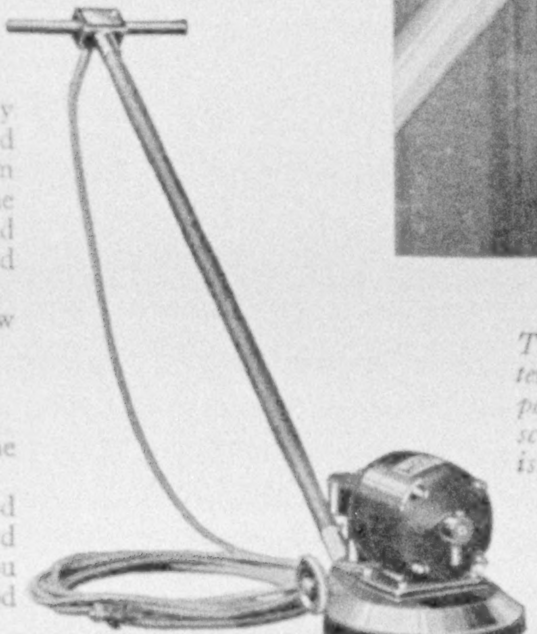
FOR YOUR BUSINESS TOO: *Thousands of leading firms keep their floors spick and span with the Ponsell. Far cheaper than hand labor. Write for information. See coupon below.*

New Floors *for a* Few Dollars

Household electric machine scrapes, refinishes, waxes, and scrubs.



This one machine, by means of interchangeable brushes and blocks, performs five different jobs—it scrapes, sandpapers, waxes, polishes, and scrubs.



A NEW and extremely easy way of caring for floors is here offered you. It is radically different from anything in your experience. It is the application of electric power and mechanical genius to an old, old problem of the home.

New floors and old—both show amazing improvement.

Five Astonishing Results

The Ponsell Electric Floor Machine brings you five important benefits.

First, it removes from a wood floor all the hardened dirt, the old shellac or varnish. Once more you see the lovely surface of the wood itself.

Second, it sandpapers the surface to a texture of satin. A skilled carpenter working many hours could not make that surface smoother.

Third, it rubs wax into the wood. It rubs with a speed and vigor impossible to attain by hand. Thus, by friction, the wax warms, spreads evenly over the entire surface, goes 100% farther.

Fourth, it polishes—and how it polishes! Your floor gleams with a surpassing luster, assumes a mellow natural glow, glistening on in spite of dust and footsteps. And refinishing only needs to be done ONCE! All that is necessary afterward is a few minutes waxing and polishing once in awhile—an operation that the machine makes absurdly easy. Then your floors *always* look as though they had been refinished the day before.

Fifth, the machine scrubs such floors as need scrubbing. Thus it cleans them thoroughly, more thoroughly perhaps than they have ever before been cleaned.

Floors of All Kinds

The Ponsell Floor Machine takes care of *all* your floors. It gives linoleum a luster surpassing anything you have ever known . . . a surface so immaculately smooth that dust and dirt have a hard time sticking to it. The Ponsell scrubs tile, cement, or any other kind of floors as they never could be scrubbed by hand, and without the least splashing.

With the machine it is ridiculously easy. No skill is necessary, no great strength or energy. The Ponsell is easier to operate than a vacuum cleaner. You do not push or pull it—you simply guide it. In a few minutes eight-year-old children have become expert in its operation.

Our greatest argument is the machine's actual performance. You owe it to yourself to see a demonstration. You owe it to your home to learn more of this wonderful machine. Use the coupon; ask us to send you immediately full information and prices; let us tell you which of our 24 branch offices is nearest to you, so that you may arrange if you wish for a FREE demonstration in your own home—or a 10-day FREE trial if you are too far from the nearest office.

N. G. 6-29

PONSELL FLOOR MACHINE CO.
Dept. 629, 220 West 19th St., N. Y. C.

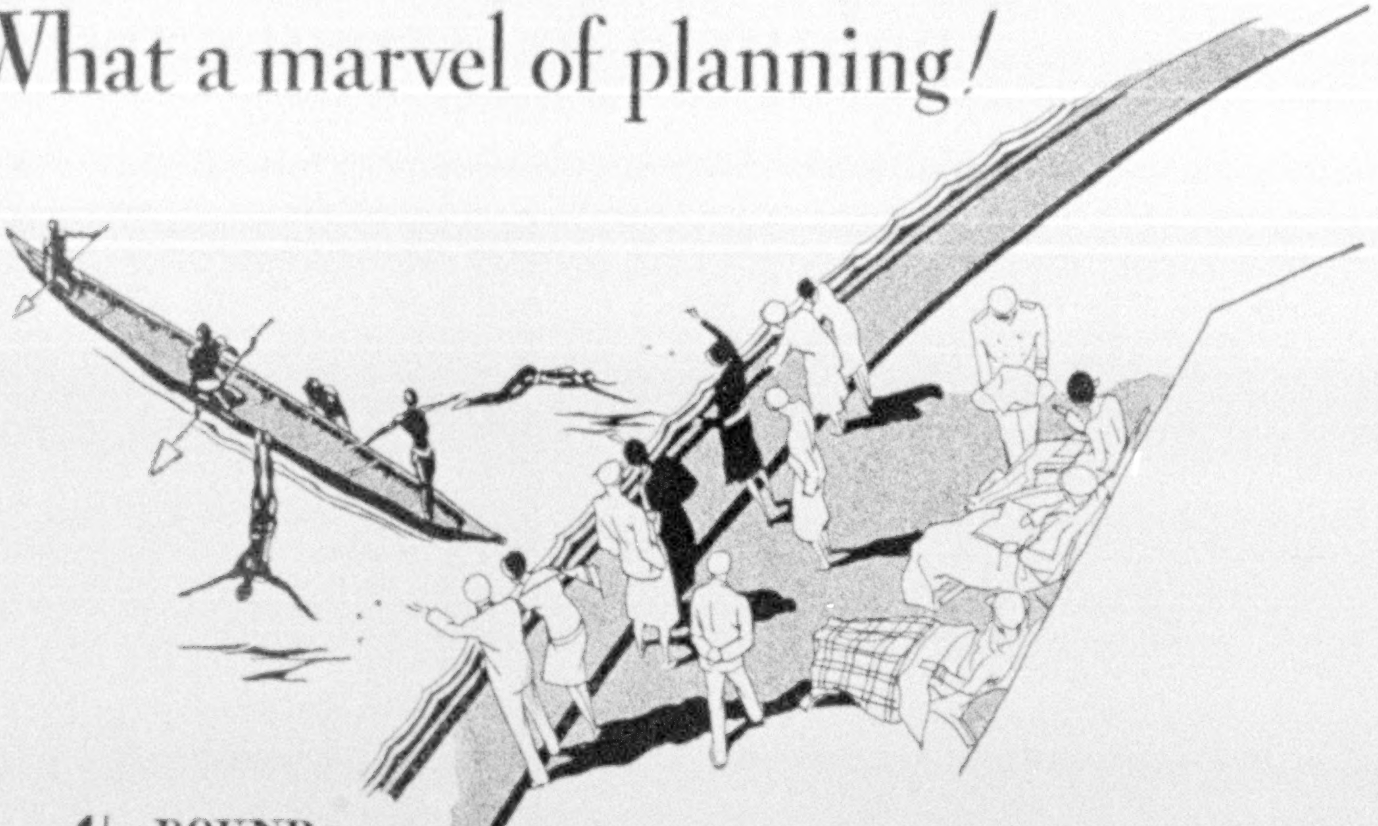
Please mail me full information regarding your Electric Floor Machine.
I am interested in { business / residence } floors.

Name...

Address...

City.............................. State..............

What a marvel of planning!



ROUND-THE-WORLD CRUISE

After seven years of World Cruises... after another year of investigating, arranging, adjusting... this World Cruise!

Alluring odd corners...Bangkok, Sumatra, Formosa. The Java stay stretched to include the Boroboedoer. Ceylon kept at 4½ days by unanimous vote of all the been-theres. India...the cross-India tour...high-spot of all high-spots. 5½ days allotted to Peking and Great Wall region. A full week in Japan... penetrating to Nara, Kyoto, Nikko.

The cruise is timed to put you in Bethlehem for the most impressive of Christmas Eves...in Cairo for the most glamorous of New Year's Eves. Up-country India...Delhi ...Agra...Fatephur-Sekri in cool January. China is celebrating its New Year when you arrive, and Japan will be bursting into plum-blossom. Home for Easter.

The cruise unfolds, in progressive panorama, the five great world-epochs, covering Italy, Greece, Egypt, India, China.

The ship again is the Empress of Australia 21,850 gross tons. Marble bath suites. Commodious single cabins. Roman pool. Paris-chef'd dining-room. From New York, Dec. 2, for 137 glorious days.

SOUTH AMERICA - AFRICA CRUISE

From New York, January 21, 104 days. Duchess of Atholl, 20,000 gross tons. The strangest contrasts, the most curious corners of the world. As low as $1500.

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The alluring details are in booklets. If you have a good travel-agent, ask him. Information also from any Canadian Pacific office. New York, 344 Madison Ave. . . . Chicago, 71 E. Jackson Blvd. . . . Montreal, 201 St. James St., West...and 30 other cities in United States and Canada. Personal Services.

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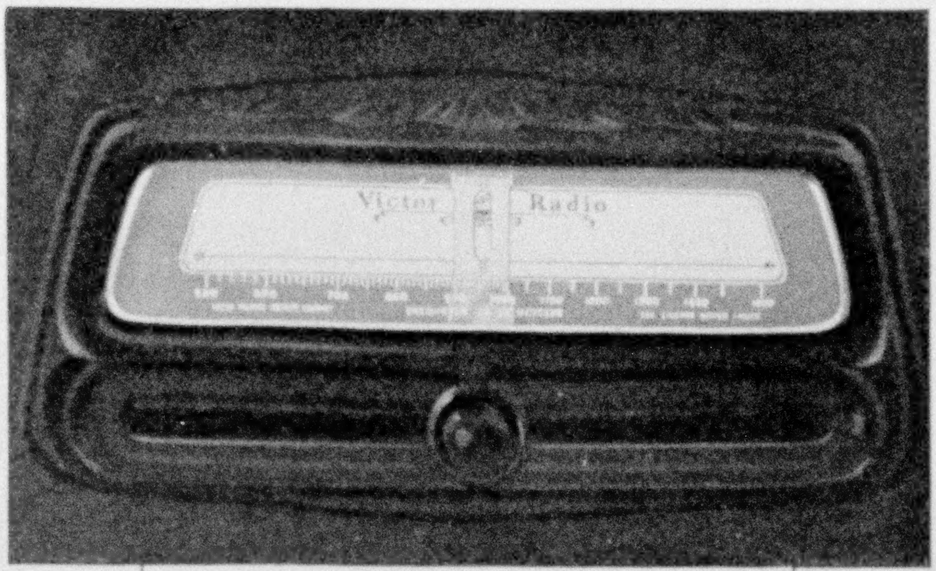
World's Greatest Travel System

Now! Victor-Radio

with Electrola



FULL-VISION, SUPER-AUTOMATIC STATION SELECTOR: All stations plainly and permanently visible . . . just slide the knob to right or left—and in comes the station you want!

The instrument that millions have waited for

New in principle . . . new in design

It was inevitable . . . the maker of the world's finest talking machine was destined to create the radio achievement of the age.

And now you have it . . . a radio by Victor . . . with Victor's quarter century of acoustical experience behind it . . . with Victor's enduring craftsmanship built into it . . . and at a price you can afford!

An all-electric radio that Victor is at last proud to trademark "His Master's Voice."

A radio that is not merely a step ahead . . . but years ahead . . . in design, in principle, in idea!

A radio that has a new simplified station selector — super-automatic!

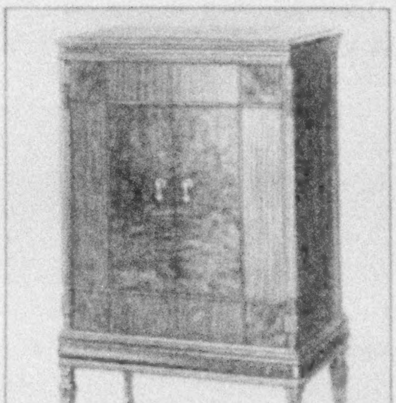
A radio that introduces a marvelous new Victor improvement in tone reproduction.

An all-Victor Radio . . . available in a handsome console cabinet that you will be proud to own . . . or, combined with the famous Victor Electrola . . . in one beautifully designed cabinet no larger than your old Victrola . . . each attuned to the same electro-dynamic reproducer.

. . . two REAL Victor instruments . . . so ingeniously combined that you switch from favorite station to favorite record . . . at the mere turn of a tiny knob . . . and for the first time . . . get tone quality from a radio that matches the marvelous tone quality of the new Orthophonic Records!

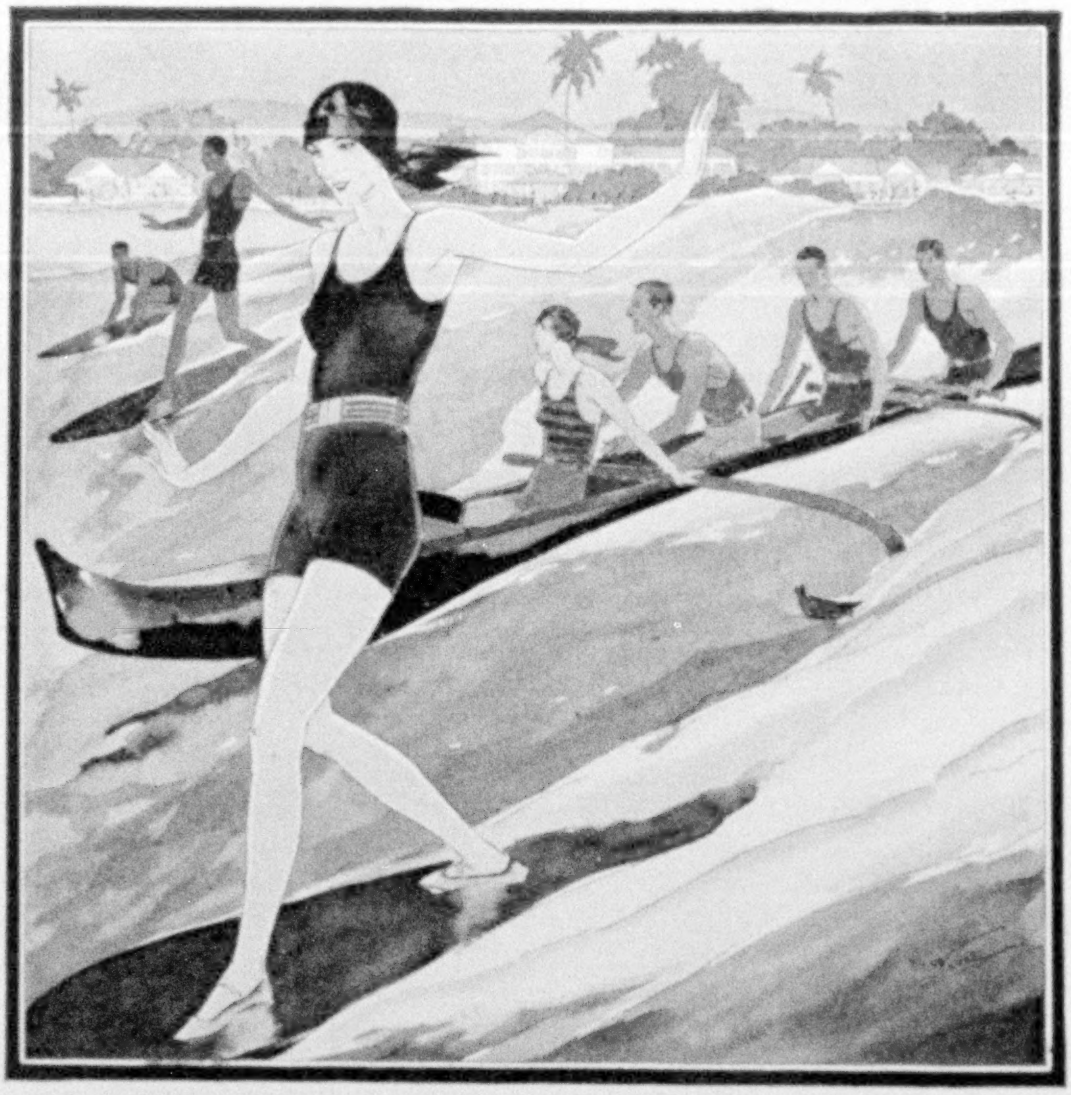
No less an achievement are the list prices! Only $155* for the Victor Radio Console . . . only $275* for the Victor Radio-Electrola. Values made possible by Victor's great resources and manufacturing skill.

Hear Victor's greatest achievements in radio and record enjoyment . . . see and hear Victor's latest contribution to musical America! Victor Talking Machine Company, Camden, N. J., U. S. A.



VICTOR-RADIO-ELECTROLA RE-45
List Price $275.
**Less Radiotrons*

Victor-Radio
with Electrola



In the Water or Out—it's Cool all Summer in **HAWAII**

WHAT a summer's vacation it will be—to live for a few weeks where the water is a place to *play*. . . . . where the air is almost as cool as the smooth green breakers that slide and rustle on the coral sands!

Here are long curving beaches, sparkling with holiday color and gayety, where bronze-skinned Hawaiians will teach you how to balance on speeding surfboards. Native outrigger canoes ride the breakers at toboggan-speed. There's a thrill even in watching them from the smart *lanai* of your beach hotel.

Golf courses everywhere. Motoring, sightseeing, game-fishing, cruising among the fairy islands of Oahu, Kauai, Hawaii and Maui. Hawaiian music and dancing, strangely beautiful. Volcanic marvels in Hawaii U. S. National Park, where giant tree ferns line the motor road to Kilauea's mammoth steaming crater.

Hawaii is only 2,000 miles (four to six days' delightful voyage) from the Pacific Coast, and all-inclusive tours range upward from $300 for three weeks, to $400 and $500, including all steamers, hotels and sightseeing, for a month's trip. De luxe accommodations, also, equal to those of Europe's most renowned resorts.

Ask your local railroad or travel agent to book you direct from home via San Francisco, Los Angeles, Seattle or Vancouver. No passports or formalities—Hawaii is a U. S. territory.

HAWAII

The **WORLD'S** *Enchanted Island Playground*

LASSCO LINE from LOS ANGELES

Sailings every Saturday over the delightful Southern route on Lassco luxury liners and popular cabin cruisers. De luxe accommodations; also economy tours on all-expense tickets. Ask at any authorized travel agency or at Los Angeles Steamship Company offices: 730 So. Broadway, Los Angeles; 521 Fifth Ave., New York; 140 So. Dearborn, Chicago; 609 Thomas Bldg., Dallas; 685 Market St., San Francisco; 119 W. Ocean Ave., Long Beach, Calif.; 213 E. Broadway, San Diego, Calif.

MATSON LINE from SAN FRANCISCO

Sailings every Wednesday and every other Saturday over smooth seas on fast de luxe liners; also popular one-class steamers. Novel entertainment features—glorious fun. Attractive all-expense Island tours. Regular sailings from Seattle and Portland, Ore. See your travel agency or Matson Line: 215 Market St., San Francisco; 535 Fifth Ave., New York; 140 So. Dearborn St., Chicago; 1805 Elm St., Dallas; 723 Seventh St., Los Angeles; 1319 Fourth Ave., Seattle; 271 Pine St., Portland, Ore.

HAWAII TOURIST BUREAU

P. O. BOX 3615, SAN FRANCISCO—P. O. BOX 375, LOS ANGELES—P. O. BOX 2120, HONOLULU, HAWAII.

Please send me Hawaii booklet in colors and a copy of "Tourfax" travel guide.

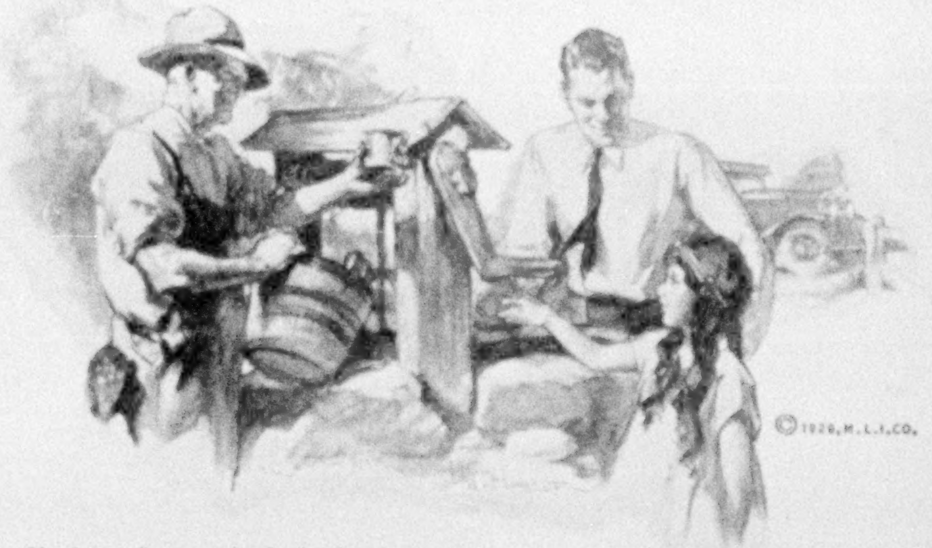
57

Name ______________________ *Street & No.* ______________________ *City* ______________________

Ready for a Drink?

CLEAR, cold water from an old-fashioned well looks mighty tempting on a hot day. One might naturally think that if the owner of the well drinks the water it must be pure. But the fact that he has drunk the water without apparent harm does not prove that the water is pure.

Science has discovered that a few individuals have been able to drink water more or less polluted with typhoid germs without contracting typhoid fever. But it is never safe for anyone to take immunity for granted.



"You're welcome. And it's the finest water in the world. I've been drinking it for 50 years."

Last year in the United States, approximately 65,000 persons were stricken needlessly with typhoid fever and 6,500 died.

Those who recover from typhoid fever are left in such physical condition that for about three years after an attack the deathrate of such persons is twice the normal rate for the same ages.

The story of inoculation which prevents typhoid fever is a brilliant page in the history of the many triumphs of science over disease.

During the Spanish-American War, 281,000 of our men went into service. *One out of every twelve contracted typhoid.* In the World War there were 4,000,000 American soldiers, nearly all inoculated against typhoid. Although many of them were sent to typhoid-infected areas, only *one out of every 3,700 had typhoid.*

While typhoid fever frequently comes from drinking polluted water, it also comes from infected milk and various other contaminated foods, and from unsuspected "typhoid-carriers"—a few individuals who have recovered from the disease but who continue to carry the germs. When typhoid-carriers are employed as helpers in households, hotels or restaurants there is great danger that they will cause infection among those they serve.

Inoculations against typhoid fever are extremely simple and leave no scar. They protect from two to five years. Why take chances? Be prepared for your motor, camping and hiking trips this year. Go to your doctor for the protection he can give.

THE LIGHT THAT NEVER FAILS

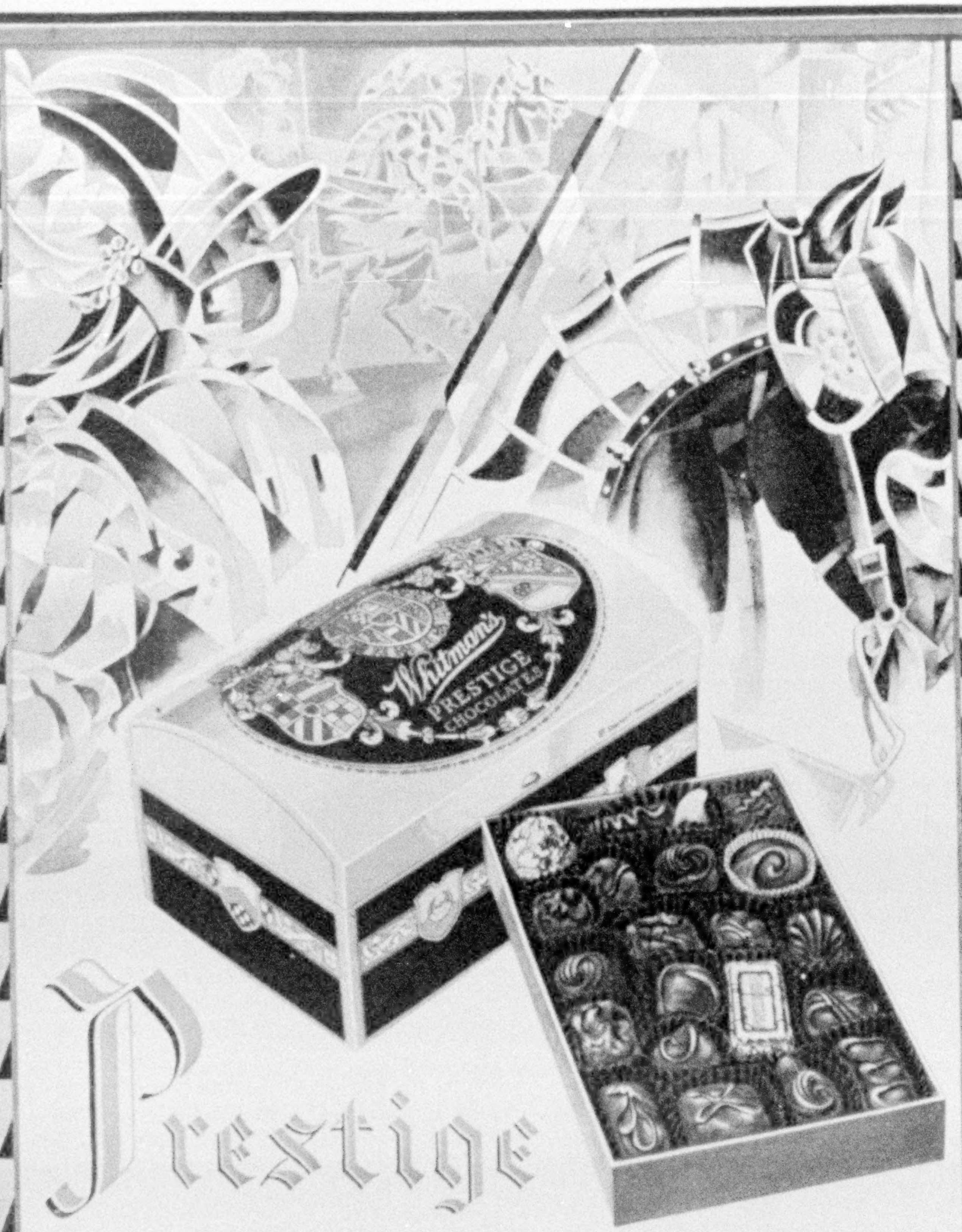
* * * *

Wherever cities protect their supply of drinking water from sewage or purify their water by chlorination the deathrate from typhoid drops. A marked reduction also takes place in communities where milk and food supplies are carefully protected and food handlers thoroughly inspected. But until this protection is general in cities, towns and villages and in country districts as well, typhoid inoculation is vitally necessary.

The Metropolitan will be glad to mail, without cost, its booklet, "The Conquest of Typhoid Fever," to anyone who requests it. Address Booklet Department, 69-N, Metropolitan Life Insurance Company, New York, N. Y.

METROPOLITAN LIFE INSURANCE COMPANY—NEW YORK

Biggest in the World, More Assets, More Policyholders, More Insurance in force, More new Insurance each year



The glory of past triumphs and the power to win fresh laurels. The word that stands for reputation based on ability, success and service.

Fit name then for the chocolates that sum up the best skill and tradition of eighty-seven years' fine candy making—Whitman's PRESTIGE CHOCOLATES.

At $2.00 a pound, Prestige Chocolates give value plus the pleasant consciousness that you are getting absolutely the finest thing of its kind. Every piece of chocolate in the package is a Prestige special. When you wish to give a very particular gift—send a Prestige.

Whitman's

PRESTIGE
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Vol. LV, No. 6 WASHINGTON June, 1929

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THE DESERT ROAD TO TURKESTAN

Twentieth Century Travel Through Innermost Asia, Along Caravan Trails Over Which Oriental Commerce Was Once Borne from China to the Medieval Western World

By Owen Lattimore

With Illustrations from Photographs by the Author

THE caravan routes which link the far interior of China with western Mongolia and Chinese Turkestan, the heart of Asia, penetrate regions less known and more remote from our modern civilization than almost any other quarter of the world. Yet they have an ancient and eventful history of their own—a history of the travels of Marco Polo 650 years ago*; a history of caravans bearing the silks of China toward the Mediterranean and the provinces of the Roman Empire, and bringing back to China the artistic and cultural influences of Greece, Persia, and India; a history of the wars and migrations of nomad Huns, Turks, Tatars, and Mongols.

During 1926 and 1927, after I had been in China nearly seven years, I traversed the whole sweep of these countries between China and India, traveling along the ancient routes in the ancient manner. Starting from Peking (now Peiping), I went up to Kweihwating, near the end of the railway which reaches up toward the southern frontiers of Mongolia (see map, page 664), and after months in the border country journeyed through the length of Mongolia by caravan and entered Chinese Turkestan.

At Kweihwating I learned from caravan traders a little of the unknown ways I was to pursue. Two great routes lead from China into central Asia: one from central China up through the provinces of Shensi and Kansu to the edge of the western Gobi Desert, and then across into Chinese Turkestan without touching Mongolia; the other from northern China up into northern Mongolia, and then westward to Chinese Turkestan.

I DECIDE TO FOLLOW THE DESERT ROAD

I could not follow the first route, because of banditry, civil war, and anti-foreign feeling. Nor could I follow the second, because in recent years the tribes of Outer Mongolia, largely under Russian influence, have succeeded in breaking away from China, and will not allow caravans to traverse their country.

Thus I was led to the new and unknown route, the Desert Road to Turkestan. Opened up by trading caravans, to avoid the hostilities of both China and Outer Mongolia, it runs through Inner Mongolia, which is nominally under Chinese

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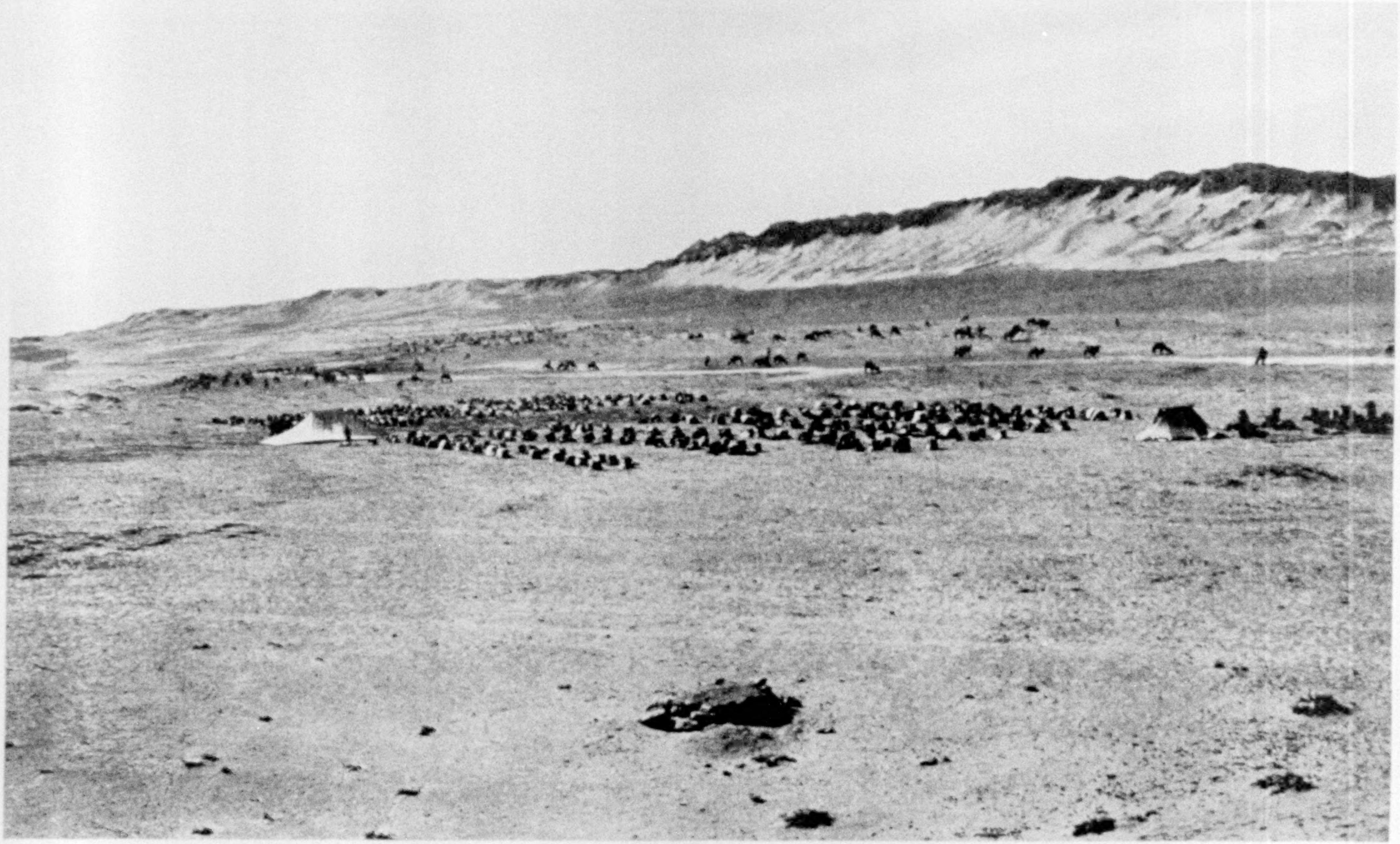
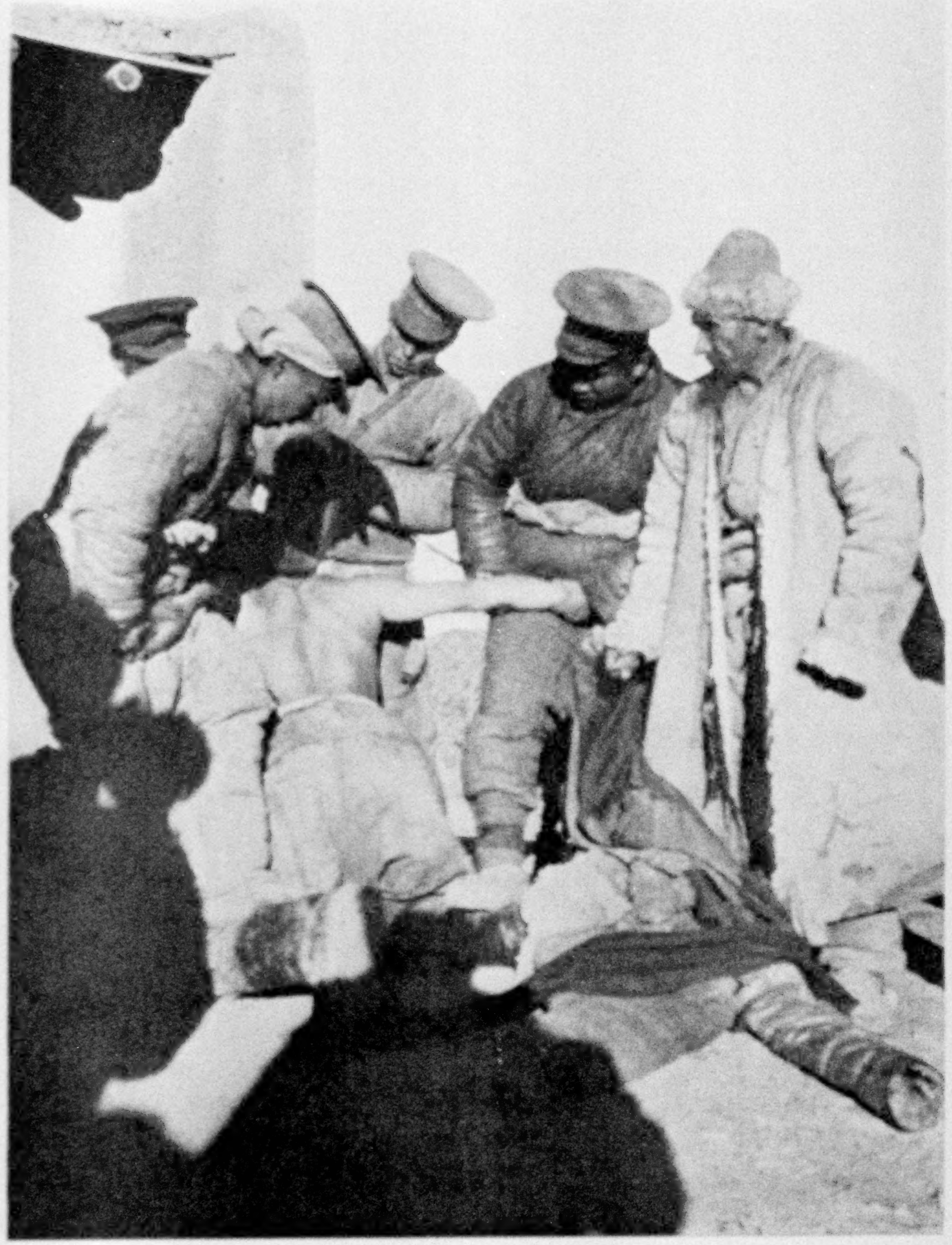
*See "The World's Greatest Overland Explorer," by J. R. Hildebrand, in the National Geographic Magazine for November, 1928.



CARAVANS ARE "PARKED" IN MILITARY ORDER

When a halt is called for the night in the heart of Mongolia, the tents are pitched and the loads placed in lines about them (see text, page 665). The author's own shelter and baggage are shown at the right. In the background the camels are grazing in a small marsh, through which trickles a tiny stream, yellow and incredibly bitter—the only water for two days. Beyond are desert hills half buried in sand.

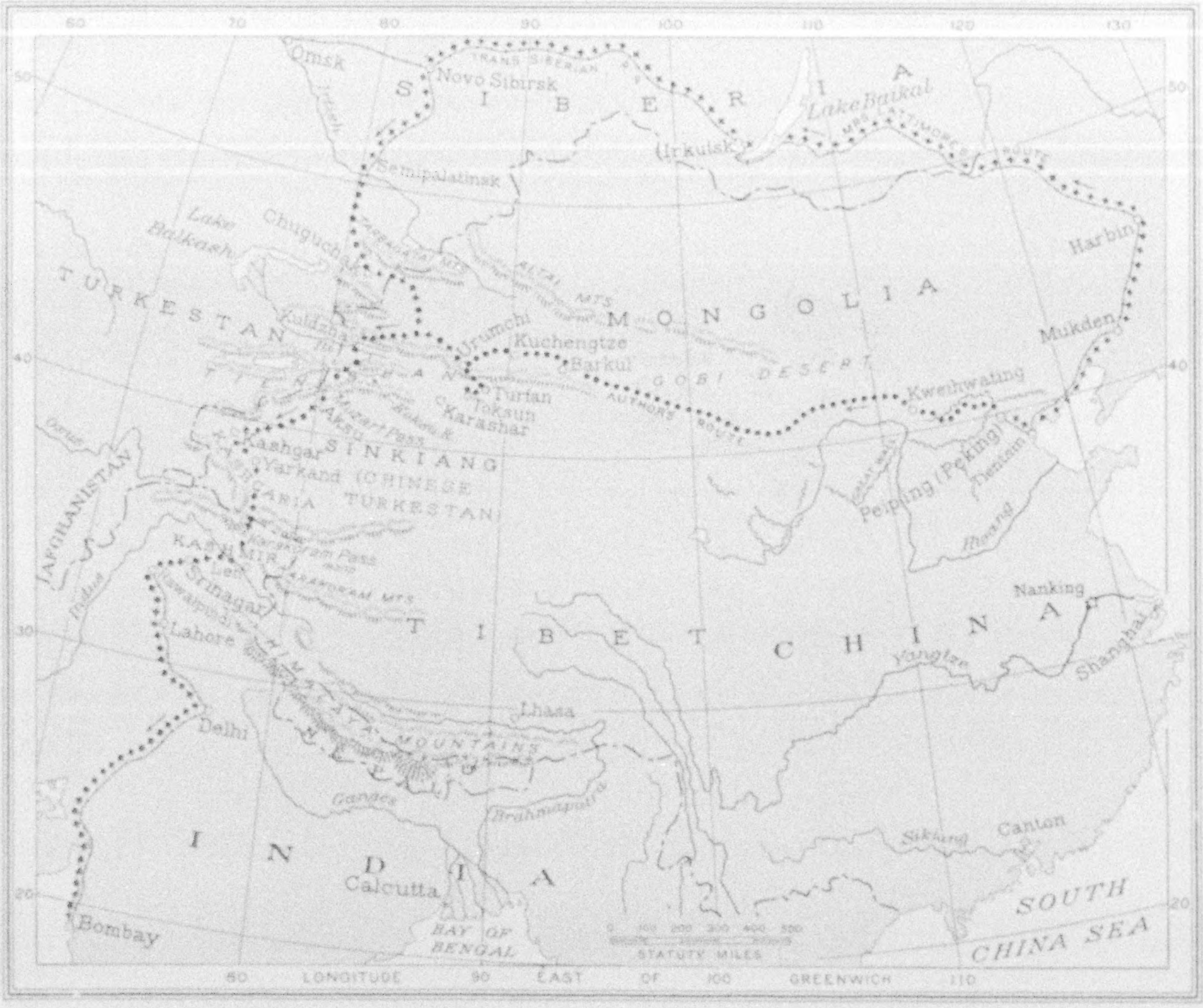


THE "THIRD DEGREE" IN CENTRAL ASIA

On the borders of Turkestan a Mongol, "put to the question" to discover whether he knows anything about the theft of a pony, receives on his bared back 360 lashes of a riding whip. The Chinese consider too much leniency a sign of weakness in ruling tribes.

HIS FARE IS AS FRUGAL AS THE PRETENDED DIET OF FRIAR TUCK

In utterly desert country camels are fed from nose bags—one double handful of barley or dried peas to each animal every 24 hours. At sight of a man carrying these ration-holders the whole herd will rush toward the tent.


S I B E R I A
Omsk
Novo Sibirsk
Trans Siberian R.
Lake Baikal
Irkutsk
Mrs. Lattimore's Route
Semipalatinsk
Lake Balkash
Chuguchak
Altai Mts
Harbin
TURKESTAN
Kuldja
M O N G O L I A
Urumchi
Kuchengtze
Barkul
Gobi Desert
Turfan
Toksun
Karashar
Author's Route
Kweihwating
Mukden
Aksu
Kashgar
SINKIANG
Yarkand
(CHINESE TURKESTAN)
Karakoram Pass
Karakoram Mts
AFGHANISTAN
KASHMIR
Leh
Srinagar
Indus
Lahore
Peiping (Peking)
Tientsin
Hwang
Nanking
T I B E T
C H I N A
Yangtze
Shanghai
Himalaya Mountains
Lhasa
Delhi
Ganges
Brahmaputra
I N D I A
Calcutta
Bay of Bengal
Bombay
Sikiang
Canton
SOUTH CHINA SEA
Statute Miles
Longitude East of Greenwich

Drawn by A. H. Bumstead

THE DESERT ROUTE FROM PEIPING (PEKING) TO INDIA

The author traveled as a member of a Chinese caravan from Kweihwating to Kuchengtze, a distance of 1,600 miles; then by cart to Urumchi (Tihwafu), where he was eventually joined by Mrs. Lattimore, who had traveled by rail and sled to the appointed meeting place. Thence they journeyed by horseback and cart to Leh, capital of the Kashmir province of Ladakh.

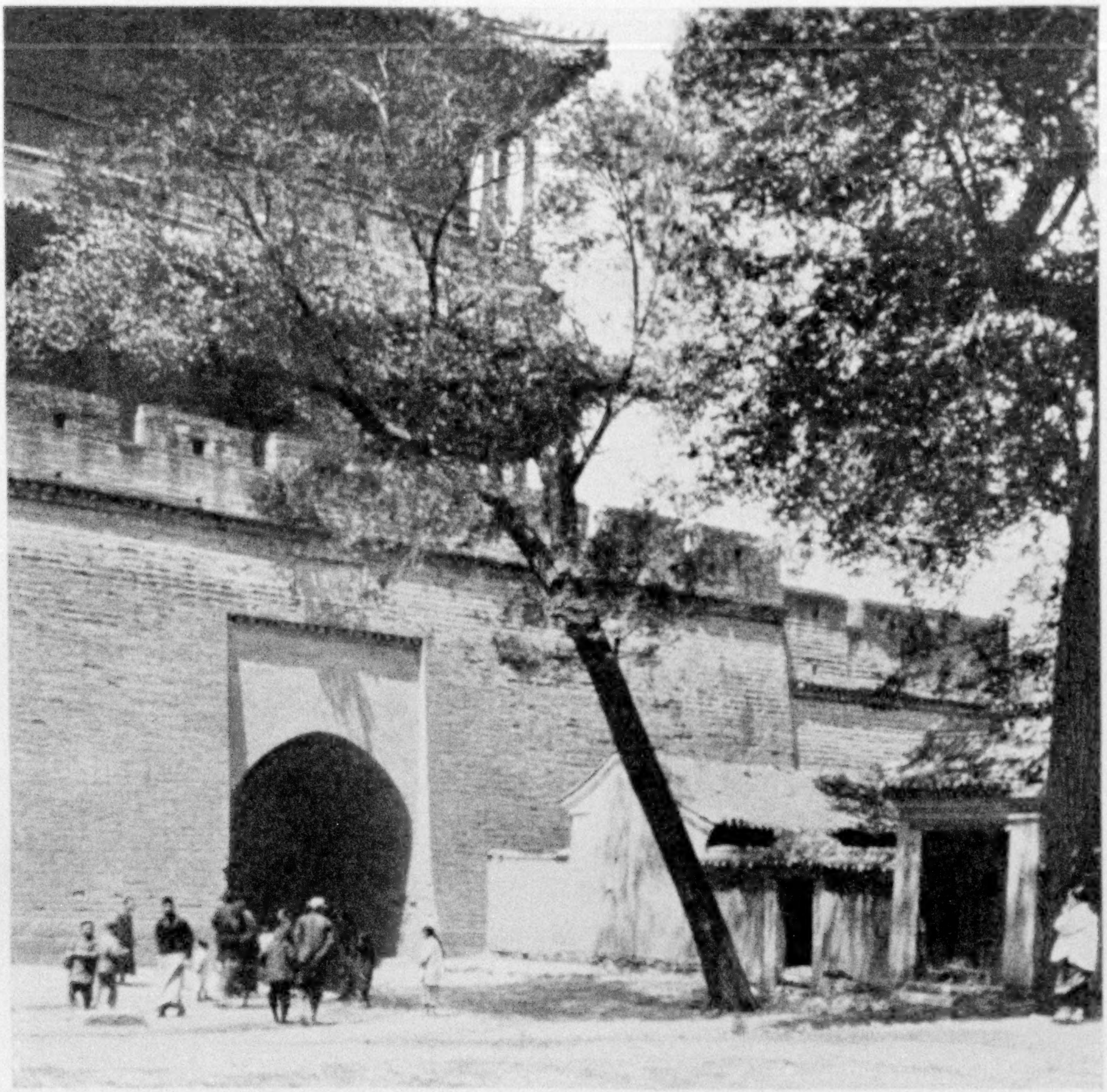
sovereignty. It traverses the most barren country in all Mongolia, and partly for that reason has remained virtually unknown.

THE HABITS OF CARAVAN MEN ARE ADOPTED

My object in traversing both Mongolia and Chinese Turkestan was to effect a comparative study both of the ancient trade routes supplementing the great routes I have mentioned and of the relation between ancient and modern channels of caravan trade. I was fortunate in the troubled conditions which led me to choose what I have called the Desert Road, for it not only took me through the widest stretches of unknown and unmapped Mongolia, but gave me evidence of ancient routes of trade and migration of great importance. The caravan journey alone covered more than 1,600 miles.

On account of the commandeering of camels for a Chinese civil war, I suffered a delay of more than five months at Kweihwating. However, I was more fortunate than others, for a large expedition which was fitting out at another point in the same territory was unable to start either that year or the next. I got away at last, because in my years in China I had acquired not only a fluent command of the Chinese language, but a knowledge of affairs, trade, manners, and customs in the far interior. With this equipment I could live and travel inconspicuously in the same manner as the caravan traders themselves.

After arranging for camels to meet me about 120 miles out in Mongolia, I left



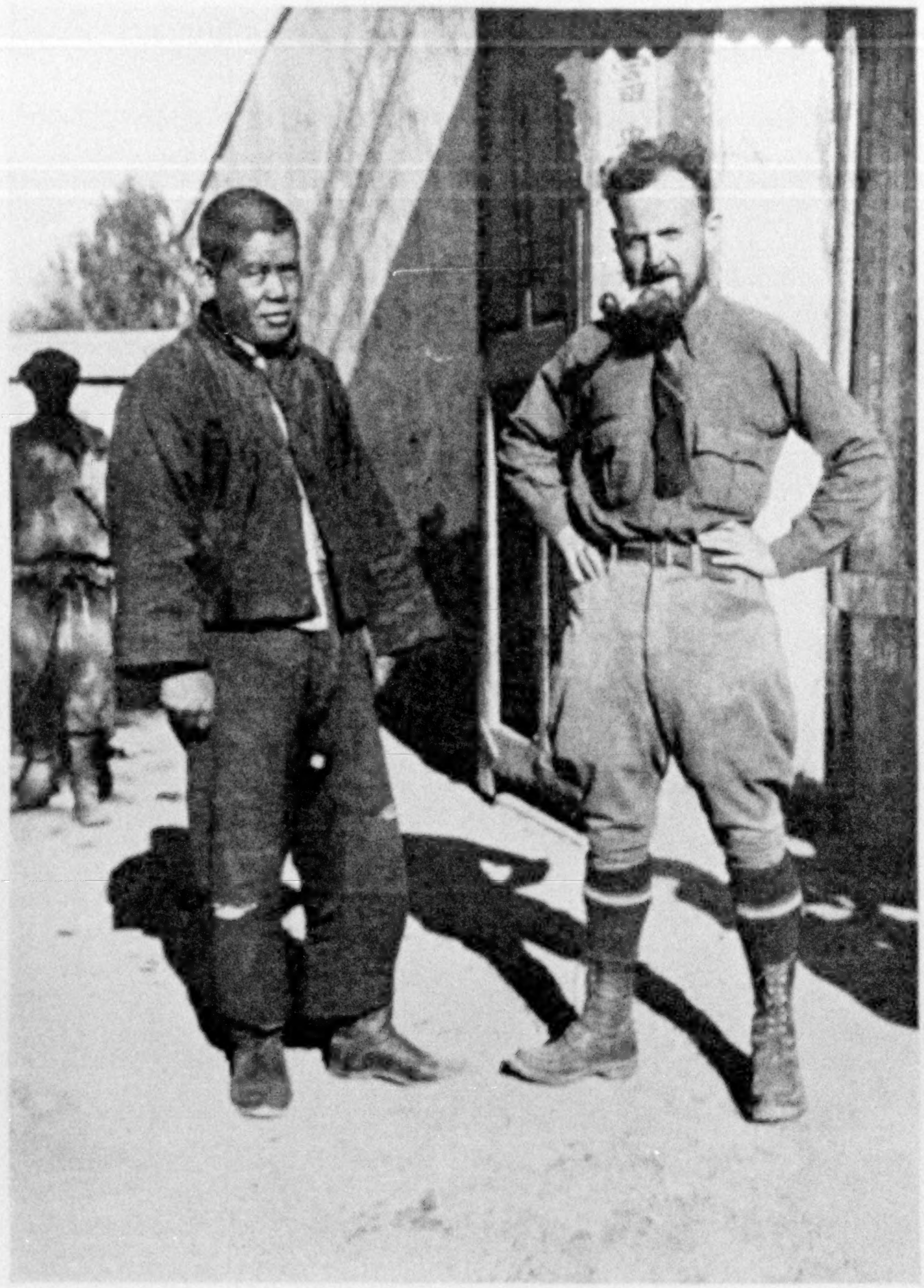
THROUGH THIS PORTAL HAVE PASSED THE RICHES OF CENTURIES

Founded as a garrison town by the Manchus, Suiyüan, the New City, one gate of which is shown above, has protected the Mongolian frontier and the caravan trade of Kweihwating for 300 years.

Kweihwating secretly in a closed cart. My caravan consisted of nine hired camels. I was accompanied only by the owner of the camels, a thorough rascal, and "Moses," a Chinese servant, who had been with me for years, and with my father before me. Moses was a sturdy fellow, so honest, reliable, and resourceful that I doubt whether I could ever have got through without him (see illustration, page 666).

In traveling we attached ourselves to large trading caravans. I came to live among these caravan men exactly like one of them. My tent was the same, my food the same, my routine the same, and before we had finished the journey my clothing more than half the same. Among them I passed as I suppose few, if any, other white men ever have, observing and mastering their peculiar customs and traditions and learning their life.

We traveled a great deal at night and turned the camels out to graze during the day, when we could keep an eye on them to prevent their straying. Beginning late in the afternoon and ending about midnight, our average march was seven or eight hours—a stage of 20 miles, which was very long, slow, and tiring, because a loaded camel, carrying 350 pounds, never goes faster than two and a half miles an hour. When we halted, the loads were



"MOSES" STOOD BY THE AUTHOR THROUGH THICK AND THIN

Though fat and forty when the hazardous journey began, the Chinese houseboy, a heritage from Mr. Lattimore's father, refused to be left behind. He lost most of his surplus flesh in one agonizing tramp of 30 miles under the hot sun of the Mongolian border. By using what he styled "hard words" to a hostile tax collector, he smuggled the entire caravan past a jealously guarded station, and on another occasion he "talked" his employer out of jail (see text, page 675).

parked in squares at the sides of the tent, and the camels were made to kneel in front of it until dawn. Then they were turned loose in charge of a couple of men.

BREAD-SAUCE IS THE MAINSTAY OF CARAVAN LIFE

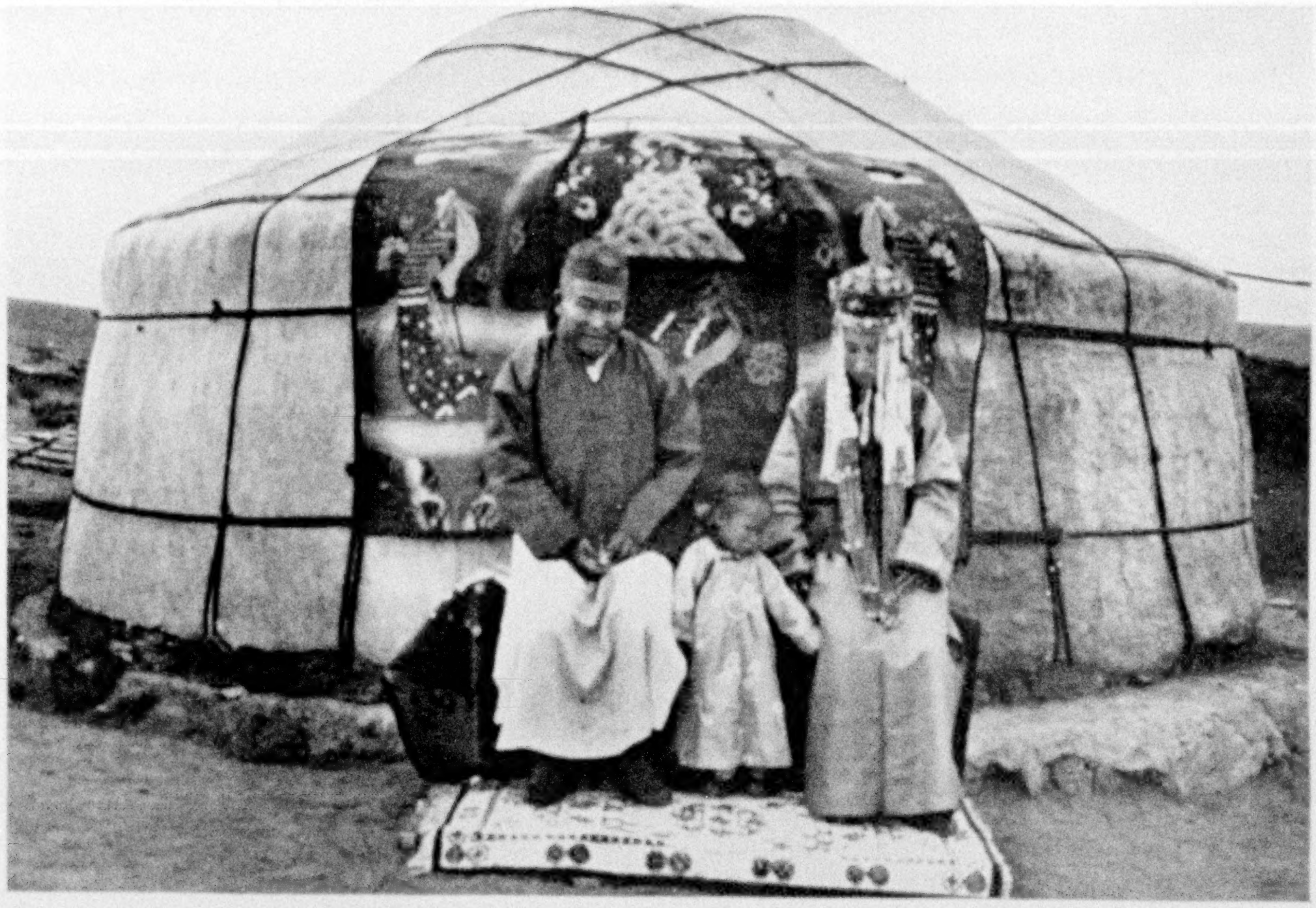
We made tea at dawn, using a very coarse grade of brick tea, the kind most common throughout Tibet, Mongolia, and many parts of Siberia and Turkestan. In Mongolia this tea is as good as currency. Prices of cattle and wool are often quoted in terms of tea bricks, and for small purchases pieces can be broken off the large compressed blocks and weighed.

Our one regular meal, taken about noon each day, consisted mainly of half-cooked dough. We would moisten white flour and roll and thump it into dough, then either tear it up in little blobs, or cut it into a rough kind of spaghetti and cook it with bread-sauce.

This bread-sauce is what the Chinese call a *pao-peitung-hsi*, a precious thing. It is the mainstay of caravan life. The basis of it is bread, which has been first fermented and then moistened. When it is covered with a rich, cheeselike mildew, it is put out in the sun and dried. Then it is mixed with bean-sauce, beans, bean-curd, ginger, red and green peppers, and anything else that will make it more pungent, and cooked with lots of mutton fat and minced mutton, and about half its weight in salt. When it has reached the consistency of a thick paste, it may be packed in a wide-mouthed wicker jar and carried along on a journey.

In spite of the salt, a green and blue scum sometimes gathers on it in hot weather; but this can be stirred in again and the mixture is as good as ever. The beans used in making this remarkable sauce are soy beans, from which is produced the base of some of our own most widely used condiments, such as Worcestershire.

In a big caldron hung over a fire of



THE CAPTAIN OF THE MERCANTILE GUARD IS WELL-TO-DO

Caravans are escorted through bandit country near Kweihwating by a corps of soldiers commanded by this Mongol officer, who is seen here at home with his wife and child. Behind the richly dressed family are Paotow carpets and under their feet is a Ningsia rug.

camel dung or the twigs of desert shrubs we would fry some sauce. To this we would add cold water. When the water boiled briskly, we threw in the spaghetti, or blobs of dough, and left it for not more than two or three minutes. As soon as the dough was partly cooked, we ladled it out of the caldron into our eating bowls, put a little more sauce on the top, and shoveled it down with chopsticks.

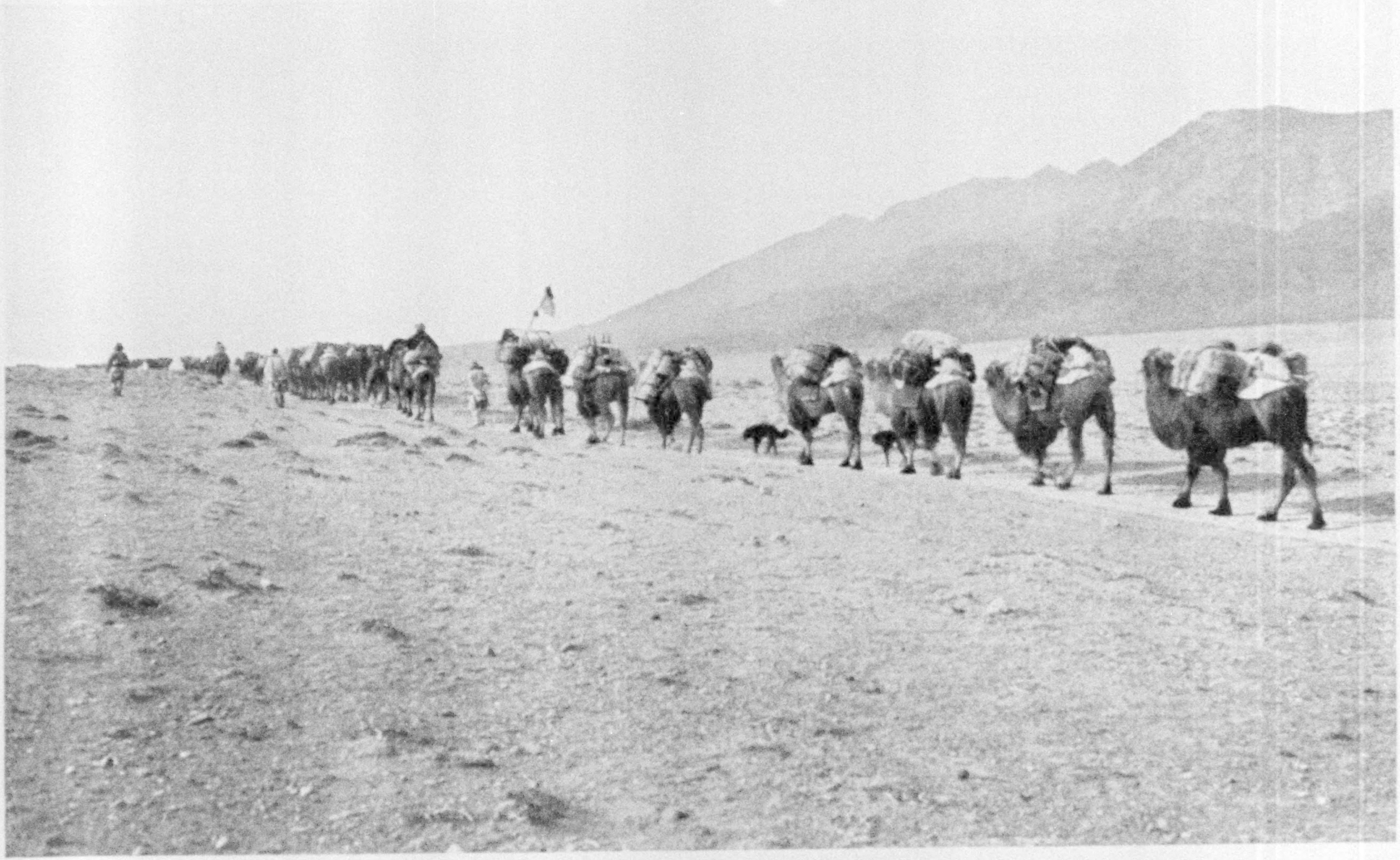
I started out with a good deal of tinned food, but it did not agree with me. After I had tried the caravan diet for a while, I gained about 10 pounds. I used to make flat pancakes and spread the sauce on them as a delicacy.

We drank enormous quantities of tea, because the water was so bad. Running water was an extreme rarity, and usually our supply came from shallow wells, heavily tainted with salt, soda, and I suppose a number of mineral salts. The worst we had was in tamarisk regions. The tamarisk is a desert shrub which sends its roots down to a great depth for moisture. In such regions surface water is turned yellow by the rotting roots and becomes thick — almost sticky — and incredibly nasty.

Sometimes we had water every day, but the average was a well every two days. Once we journeyed nearly 100 miles between wells. Over the dry stages we carried water with us, in flat-sided wooden casks, which could be loaded two on a camel.

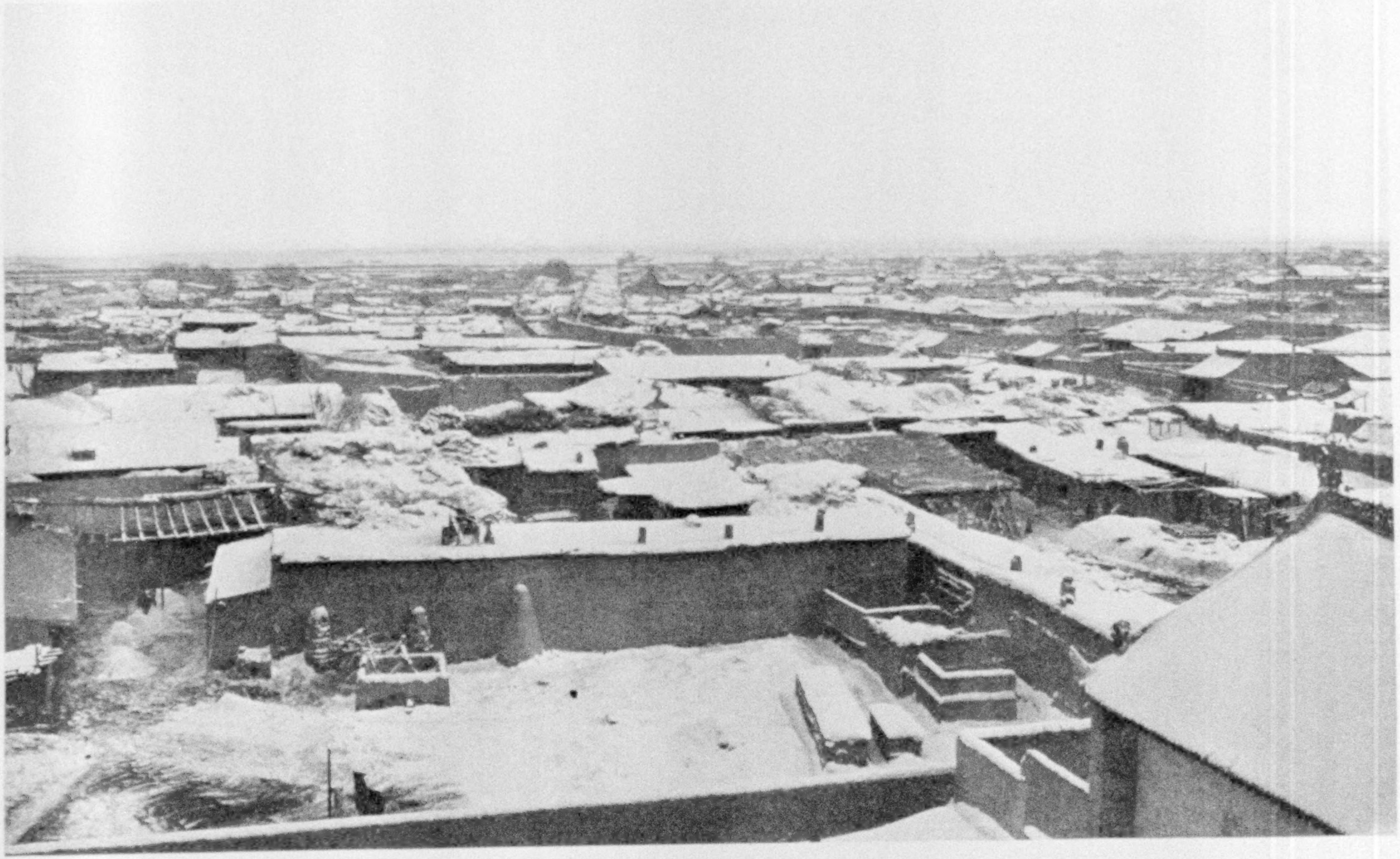
On the long marches I would ride about half the way on my camel and walk the rest of the way. My riding camel carried a soft load—sacks of clothing and the like—on top of which I sat in a little hollow, with my feet hanging over my mount's neck. The slow-marching pace of the animal was very comfortable and did not make me seasick, as some desert travelers complain.

Because it tires a camel to get on him when he is kneeling, and make him rise under the extra load, I soon learned to mount in caravan style. By means of the cord attached to a peg in his nose I would pull his head down. Then I would put my



TWO CARAVANS JOIN FORCES IN WESTERN MONGOLIA

The lead camel of the second unit carries a banner on a spear, the traditional emblem of these desert argosies. Each animal is laden with 350 pounds of brick tea, which was pressed at Hankow, brought to Tientsin by sea, and dispatched to the railhead, whence it is now being borne across the arid wastes to Sinkiang, the New Dominion, as the Chinese call Chinese Turkestan.



KUCHENGTZE IS 1,600 MILES FROM A RAILROAD

Fast time for camel freight between this Sinkiang border town and the trains at Kweihwating is three months; yet the ancient city does a thriving business. Many of the long caravans which operate here belong to families that have been in the trade for hundreds of years.

SHEEP ARE OFTEN BROUGHT TO THE TENTS FOR SALE

Though the principal item in the diet of the caravan crew is white flour, a fat ewe or ram is slaughtered about once a month and the meat distributed among the men (see text, page 666).

left foot on his neck, just behind his head, my right knee in the crook of his neck, and let go of the cord. He would lift up his head, swinging me off the ground, and I would climb up to my perch.

RUMORS OF BRIGANDS FLY FAST

At the beginning of the journey we passed a number of Mongol lamaseries, or monasteries, but later we entered the true desert, which was almost uninhabited. Not only were Mongol camps infrequent, but the people were shy, if not hostile. We were traveling in a year of great turbulence and disorder. The civil wars in China, the increase of banditry along the border and in Mongolia itself, and the troubles in Outer Mongolia had sent vague, terrifying rumors flying through the desert, and no man knew who might be an enemy or a friend.

At intervals we met caravans and exchanged news of regions where bandits or raiders from Outer Mongolia had last been seen. I sent letters back by several of these caravans, each time offering payment, which was always refused with grave courtesy.

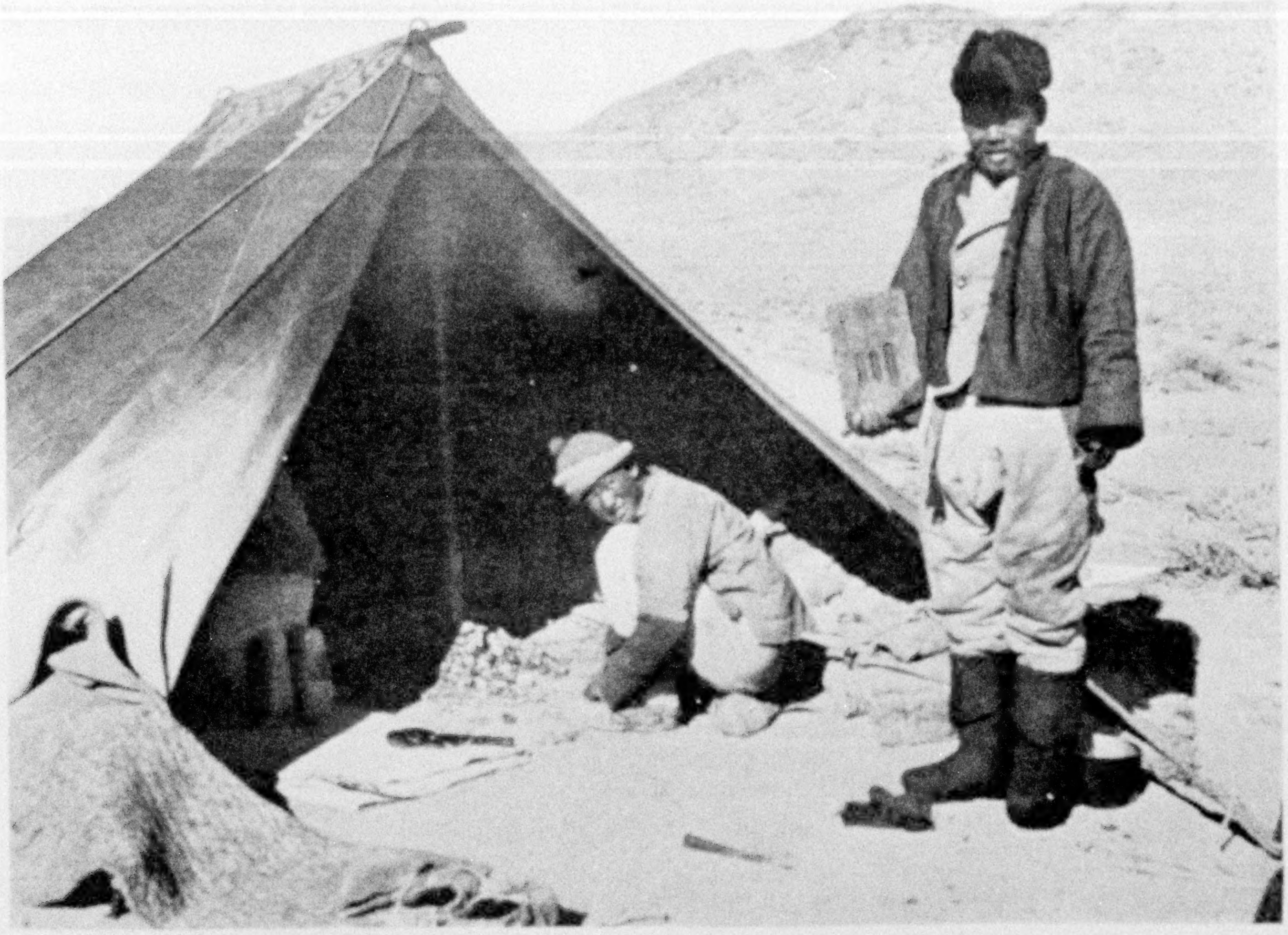
"It is the business of the Gobi," the caravan master would say. "Who would not do as much?"

With all these men, "the business of the Gobi" was a phrase covering everything that can happen to a caravan in the desert—friendship and enmity, good fortune and calamity. Every letter I sent was safely delivered, but that was because the men had recognized me and admitted me into their own fellowship.

Some years ago an expedition was sent out into Mongolia to establish a motor route to Chinese Turkestan. The only guides available were caravan men, and they saw no reason for handing over the trade of their camels to machines they did not understand. They led the automobiles from rocks to sand and then into rocks again, and of the dozen that started, only one reached Chinese Turkestan.

CARAVANS OF CORPSES

Most of the caravans we met carried wool, cotton, raisins, pelts, and hides from Chinese Turkestan; but some of them carried queerer freight. We encountered a series that were conveying corpses.



MOSES DISPLAYS A BRICK "COIN OF THE DESERT"

This coarse, harsh tea is indispensable to the Mongols and Turkis. The Chinese trade in it employs thousands of camels. It is the original "Russian caravan tea." The Russian "tea kings" who controlled the trade were men of wealth and power.

Chinese traders out in Turkestan abhor the idea of being buried in such a strange, far-away country, and they belong to guilds which look after them in case of their death on the frontier. Bodies are buried in temporary graves until most of the flesh has fallen away. Then the guild has them dug up, put in traveling coffins, and loaded on camels, four corpses to the camel load. They are carried across the desert, delivered to another office of the guild at the end of the route, and eventually distributed, each to its ancestral burial ground.

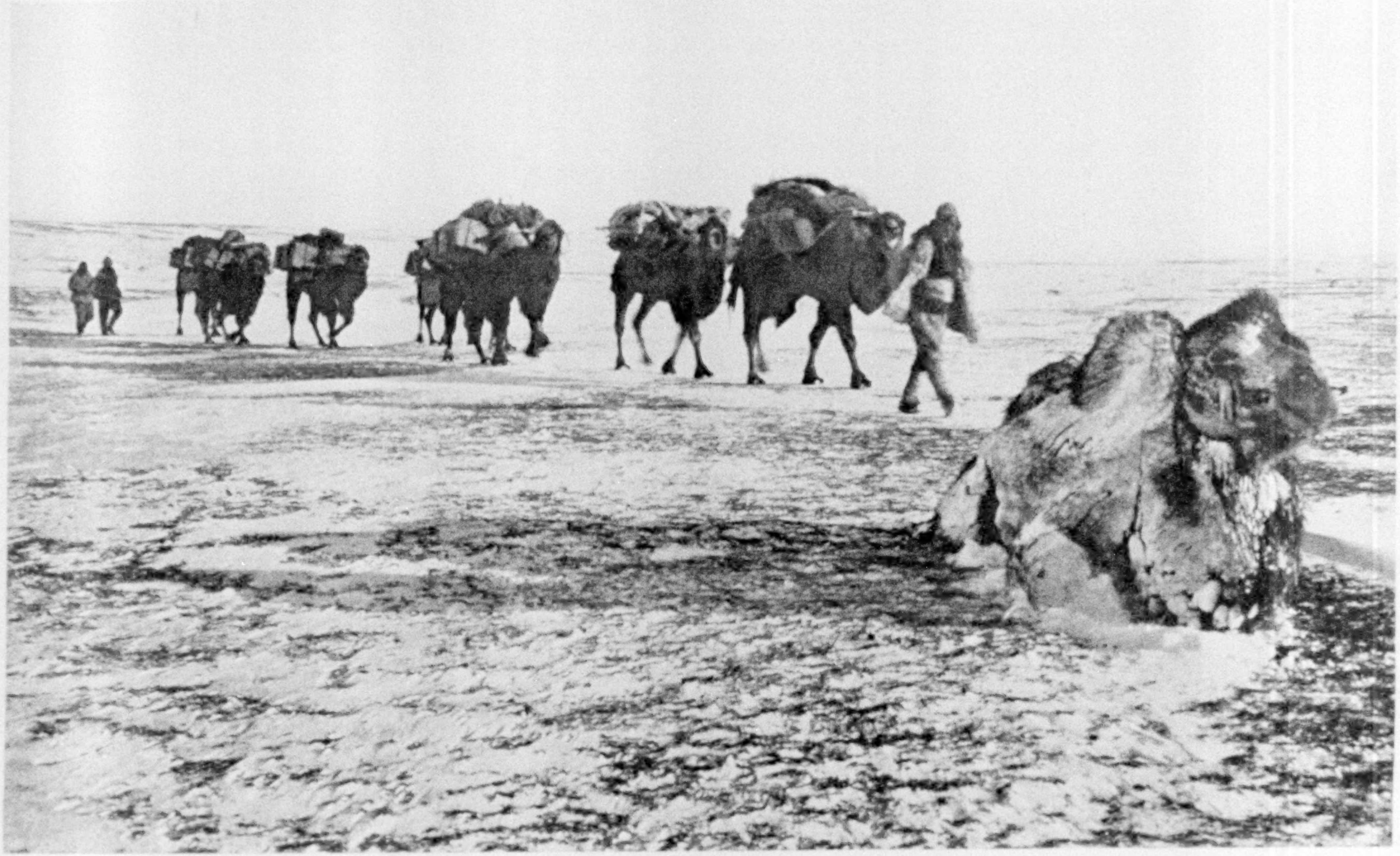
ONE OF THE MEN IS SEIZED BY A GHOST

Not long after one of these corpse caravans had passed our camp, one of our men fell ill of a violent stomach ache, and at the same moment somebody saw beside the trail an empty coffin, which we had not noticed when we camped in the dark. A panic ensued. Every man of our band cleared out as fast as he could, pulling his camels after him. All they did for the sick man was to leave a camel hobbled beside him, where he lay rolling on the ground.

The coffin found by the way had been left by the corpse carriers. Evidently it had been battered to pieces, and the men had taken out the body and stuffed it into another coffin along with another corpse. Our men thought the ghost of one of the corpses had resented the crowding and had jumped out and, being very lonely and terrified in the desert, had seized upon our unfortunate fellow traveler for a new place of abode. The man's pains, they believed, were the result of a struggle between the stray ghost and his own spirit.

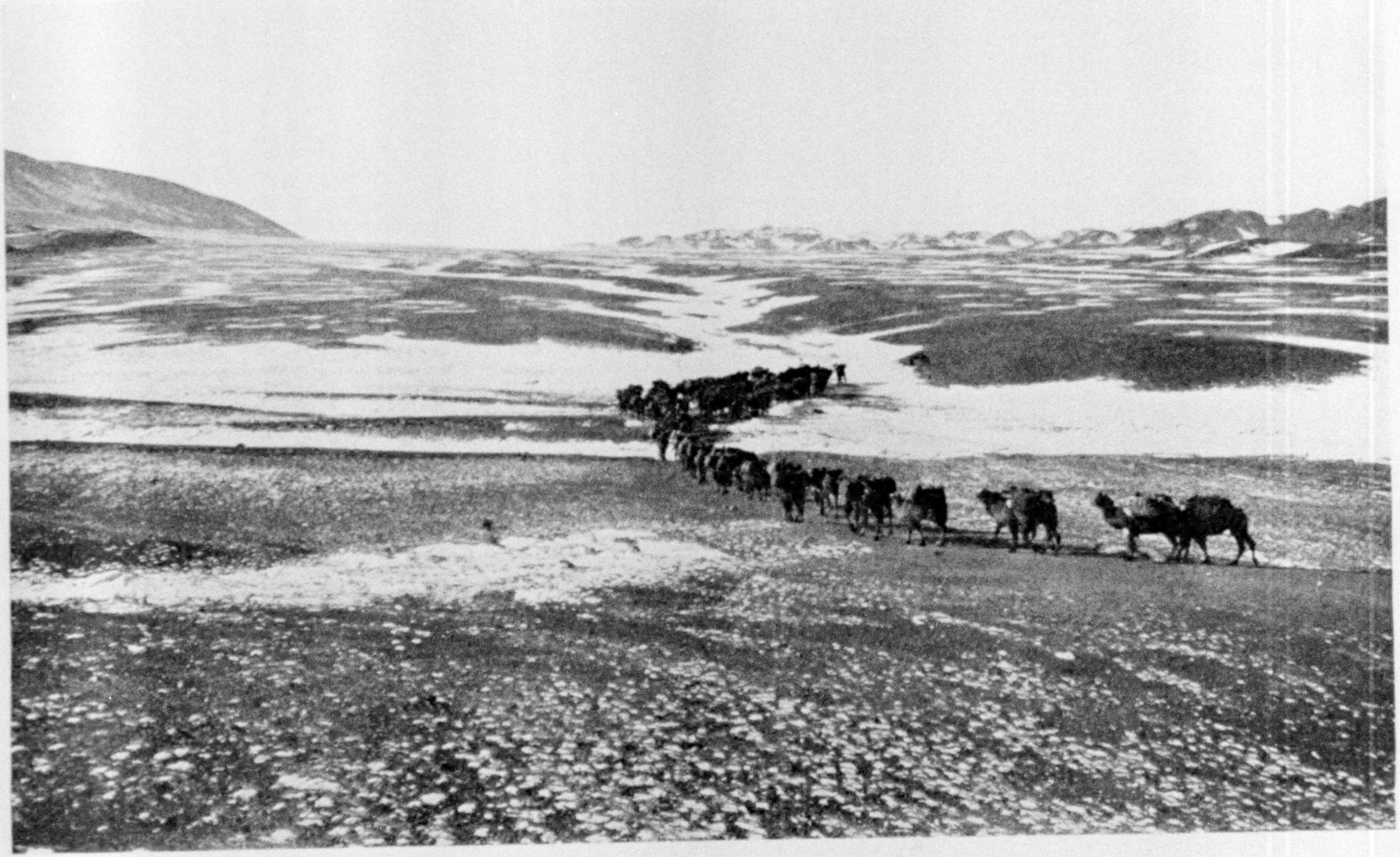
If the man died, the ghost might come after some one else. The only refuge was in flight. If the sick man got better, he could mount the camel and ride after his fellows. If he did not turn up, they would send back from the next camp to see what had happened; it would be a pity to waste the camel, anyhow.

The wretched fellow, helpless with his own pain and terror and the hypnotic



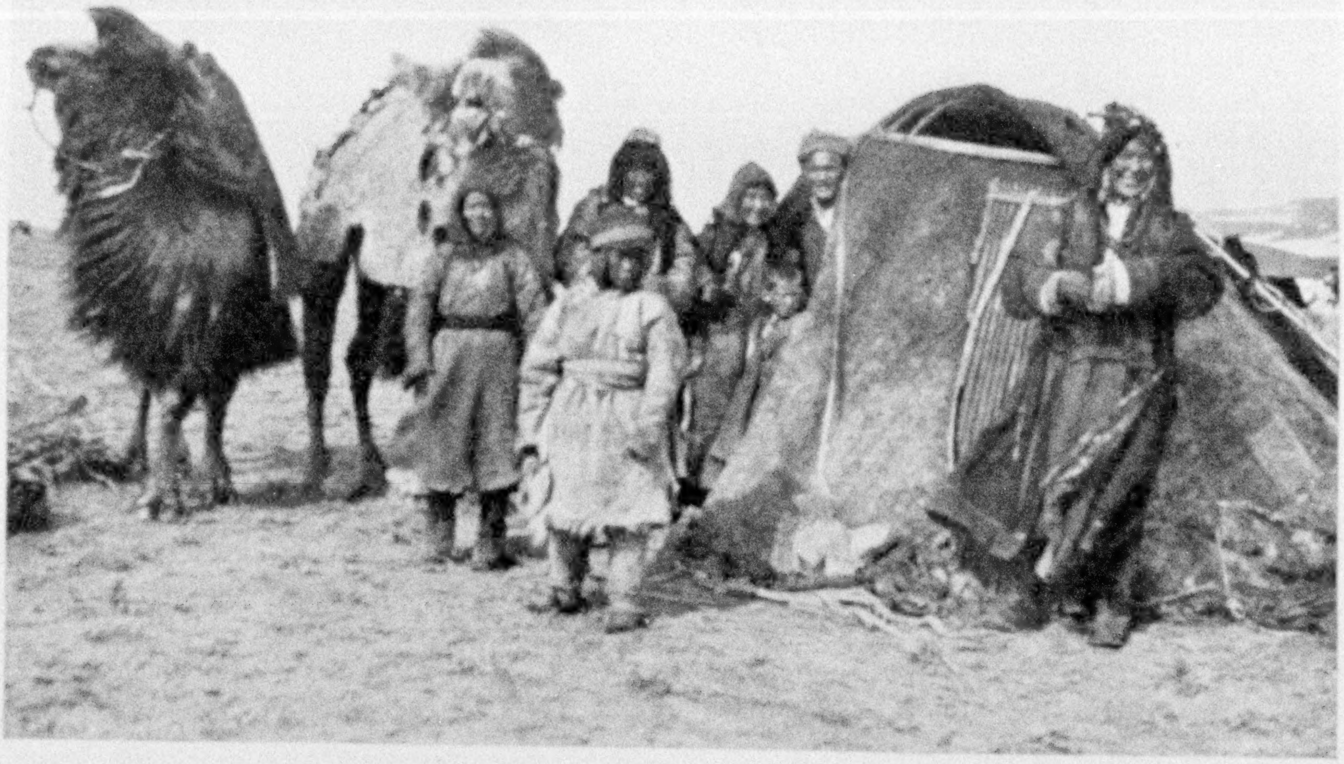
SUPERSTITION PREVENTS THE KILLING OF DOOMED CAMELS

Though covered with ice and powerless to rise, the abandoned animal at the right must live for days, slowly freezing to death. The author's caravan passed many such pitiful sights on the winter trail in Mongolia (see text, page 677).



CARAVANS APPROACHING DEAD MONGOL PASS

This wind-swept valley, though it does not reach a height of more than 7,000 feet, is dreaded for its cold and danger. Snow swept down from the hillsides chokes it throughout the winter. The author's caravan and several others, numbering more than a thousand camels in all, were trapped in the pass for a whole night, after failing to force a way through the drifts.



Photograph by Eleanor Lattimore

TORGUT MONGOLS, ON SPRING MIGRATION, HALT FOR THE NIGHT

The diminutive shelter is the top part of the yurt. On a journey like this, it serves in lieu of a pup tent. In the permanent camp it will be placed on top of a circular wall of felt-covered trelliswork to form the dome of the family habitation.

effect of being deserted by the others, would probably have curled up and died of pure fright, but, luckily for him, I had gone back that day with one of the men to fill the water casks at a well not far behind. When we set out to catch up with the caravans, we saw the sick man rolling about in agony on the ground, with a bored-looking camel standing close by.

He was groaning and crying, "Alas! my mother! Alas, my old mother, I shall not see you again, I shall die here! Alas, Old Man God, can this yet be suffered? Alas, alas! my mother, this is waiting for death!"

After questioning him a bit, I calmed him somewhat, and discovered that his ailment was nothing but a stomach ache, caused by a chill. I sent the man who was with me to tell the caravan to stop until I could get some powerful foreign medicine out of a box.

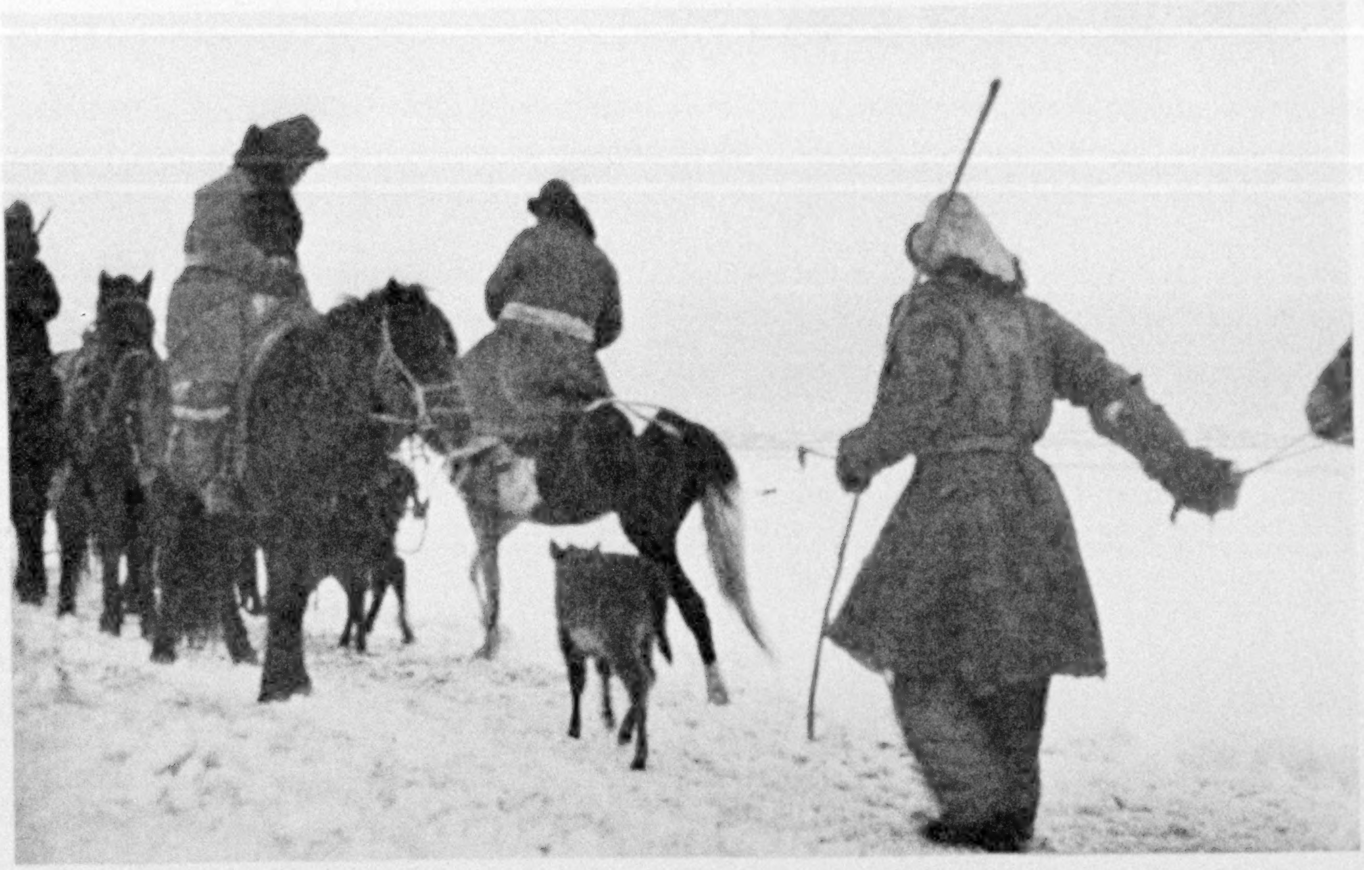
Meantime I unrolled the man, so to speak, and began to rub his stomach. It was not a promising looking stomach on the outside, but after a hearty rubbing it began to feel better on the inside.

Eventually the frightened traders were persuaded to halt, and I gave the sick man some medicine; but they were uneasy. I tried to calm them, and to persuade them that the man had not really been invaded by a ghost. I even invented some symptoms to describe how he would have behaved if he had been ghost-possessed.

I FIND MYSELF IN JAIL

Not long after this, as we approached the borders of Chinese Turkestan, we fell in with a border patrol, and without warning I found myself in jail.

The province of Chinese Turkestan is kept very tightly closed to strangers, and nowhere more tightly than on the borders nearest to China. A foreigner who enters from India gets a better reception than one who comes from China, because the officials know that they can rely upon the friendliness of the Government of India, whereas they are far from trusting the officials in the provinces of China proper.



Photograph by Eleanor Lattimore

KAZAKS OF THE WESTERN KIREI TRIBE ON MIGRATION

Nomads of the present day make two long migrations a year—one in the spring, when they march to the summer grazing grounds, and one in the autumn, when they look for sheltered regions in which to spend the winter. During the summer they are frequently on the move, in order to keep their flocks on the freshest pasture, but this traveling is not nearly so difficult as the great seasonal migrations. The spring migration is by far the most severe task they face, when they have to convoy all their sheep, goats, cattle, ponies, and camels through the snow in search of the regions where the early melting snow brings up the first grass. Men, women, boys, and girls toil all day in the snow, gathering up straggling calves and kids and lambs.

The limited group who, under the old Governor, control Chinese Turkestan are in perpetual fear that some general in China will force a civil war on them, invade the province, and take it over; and they are well aware that in recent years their soundest defense has been the wide deserts protecting them in the direction of China and Mongolia. Consequently, every traveler coming from these politically dangerous regions is detained at the frontier until his papers have been minutely examined and verified, and his case has been referred, if necessary, to the Governor.

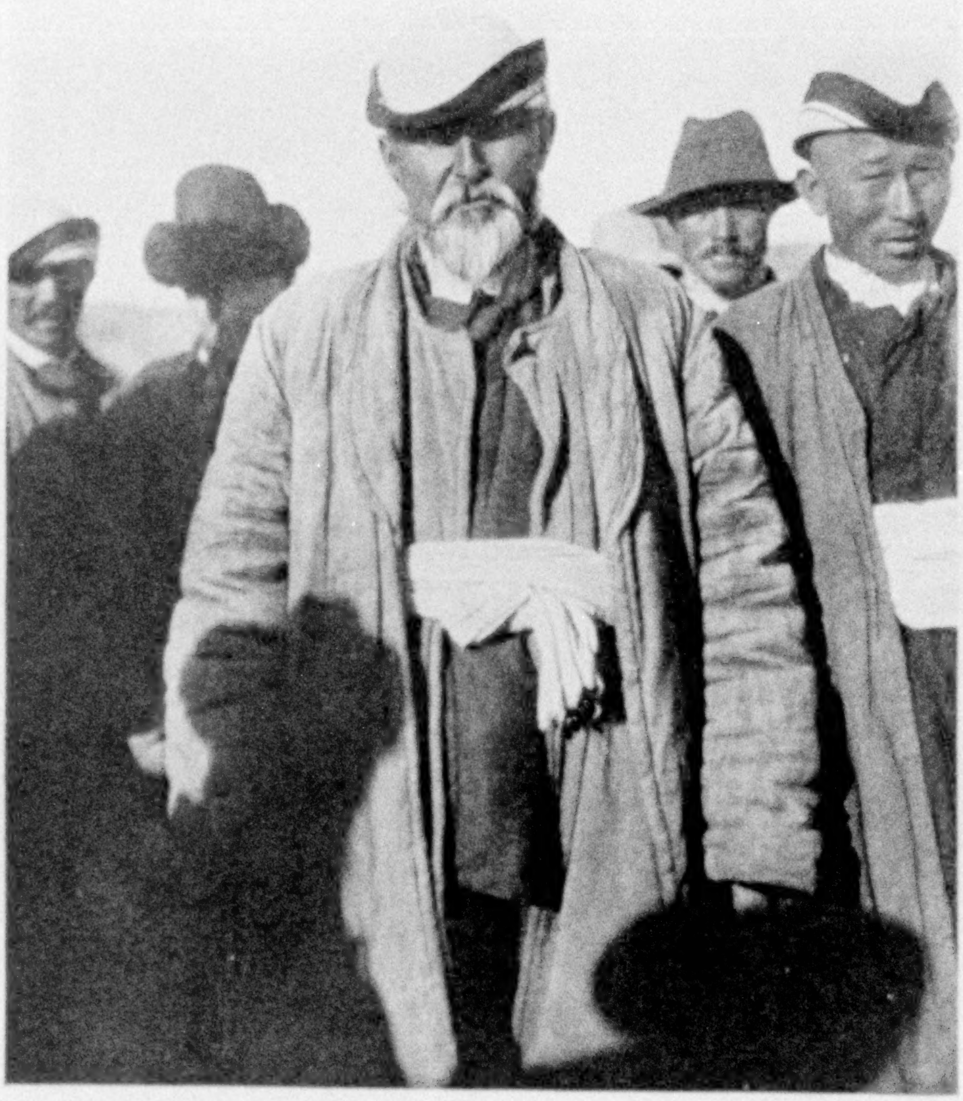
I had the awkward luck to arrive at a small post off the regular line of travel. The two officers in charge were ignoramuses, only one of whom could read even a little. This man wanted to have me kept in close confinement. First he accused me of being a Japanese spy; and when I laughed him out of that idea, he insisted that I might be one of the Russian officers in the employ of General Feng Yu-hsiang, looking for a way to invade Chinese Turkestan. At that time it was very much on the cards that such an invasion might be attempted.

MOSES COMES TO MY RESCUE

I should undoubtedly have been in for a bad time, had the men once convinced themselves that they had really caught a "hostile" Russian; but luckily I had had some experience with the type with which I was dealing, and above all I had the faithful Moses. In fact, it was Moses who brilliantly established us on an almost favorable footing.

I had thought it best at first to explain myself in a simple, straightforward way. Moses thought otherwise. "Don't you know," he said, "that the first rule of travel is, 'Never tell the truth'? Tell them what's good for them."

He understood the situation rightly; for



A NOMAD CHIEFTAIN OF SINKIANG

Followers of this leader belong to a subtribe of the Kazaks. They are related to the Mongols, the Kirghiz, and the Russian Tatars, and are found in Russian as well as Chinese territory. Parts of southern Siberia and Russian Turkestan have now been organized into the Kazak Autonomous Soviet Socialist Republic.

an attempt on our part to lay too much stress on our innocence might, according to our captors' tortuous way of thinking, simply have proved we were guilty of something. The thing to do was to impress them with our importance, the sound old Asiatic rule being that no one who is important enough is guilty of anything.

Moses was ready with a yarn that I was the nephew of an American ambassador, and after the tale had been repeated a few times I was rapidly promoted to be the nephew of an American prince, who was of the blood of the American emperor. After that, I was always addressed as the Young Prince and accorded much better treatment than I should otherwise have received. I was also permitted to retain my arms and to go about during the day under guard. I was even given leave to take my rifle and go out shooting antelope—probably because I kept the whole garrison in meat. At night, however, Moses and the camel men and I were shut up in a tiny, unheated, tumble-down hut.

My capture was reported to the town of Barkul, 80 miles away across a snow-covered mountain range, and from Barkul the report was relayed to Urumchi (Tihwafu), the capital of Chinese Turkestan. I was not permitted to send messages myself, probably for fear I might discredit my captors; but through a friendly caravan man I managed to smuggle a letter off to two English missionaries whom I knew to be at Urumchi, and to a Chinese friend in the province, an important official. Through their mediation with the Governor, word came back in about a fortnight that I was to be released.

THE HARDEST PART OF THE JOURNEY BEGINS

We had still to face the hardest part of the whole journey. It was impossible to go direct to Barkul, because the caravan road beyond was blocked by snow in the mountains. We had to skirt the mountains, keeping to the desert, and making for Kuchengtze, distant more than 200 miles.

This town holds the same position at the western end of the caravan route that Kweihwating holds at the eastern end.

It was the beginning of December and a winter of record cold and deep snow which amazed even the old hands among the caravan men. My camels were worn out after three months of travel, and although they had been resting for the fortnight while I was incarcerated, they had not had enough to eat during that time. Worst of all, the big trading caravans had all gone by; so we had to find our way alone, with little chance of help if we got into trouble.

Soon after we started, we began to find all along the road prostrate camels that had been abandoned by the caravan before us (see illustration, page 672). Trodden places in the snow marked numerous points where caravans had been overtaken by blizzards.

Many of the abandoned camels were still alive. When a camel gets to a certain stage of weakness, he can no longer get up and walk; but he has such an incredible vitality that even then he may live for many days, in spite of bitter cold and violent weather. Caravan men will not kill these camels for fear of bad luck. Even the wolves will not put them out of their misery. A wolf will pull down a standing camel, or one that runs from him; but when the camel just lies and watches him, he simply waits until his quarry dies.

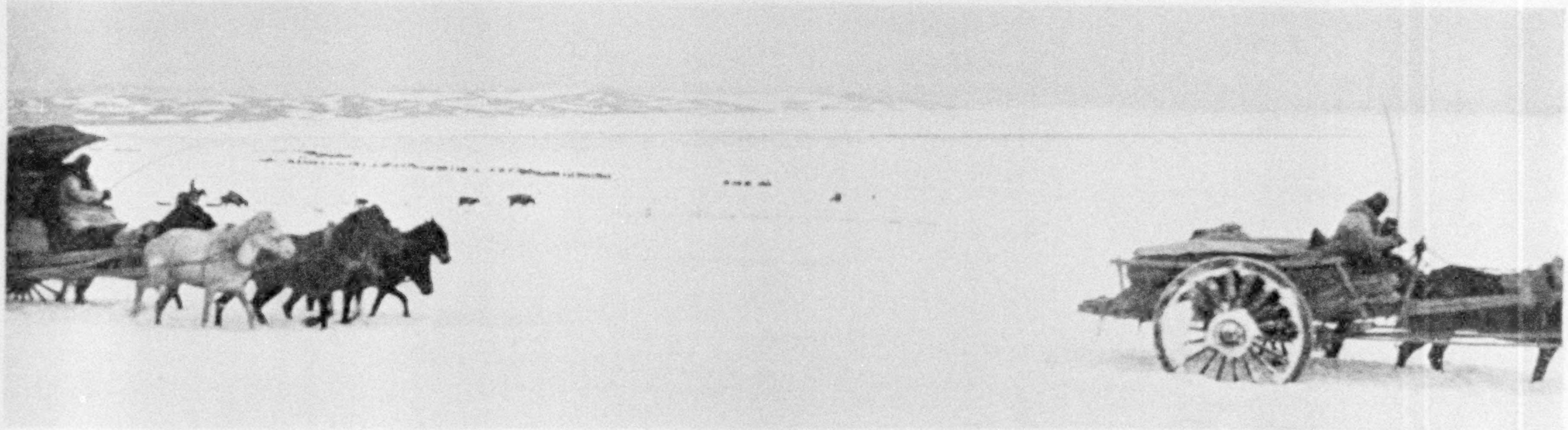
Some of the camels we saw were plated with ice on one side, evidence of the bitter weather they had lived through. They were unable to move their bodies, but as we approached they would turn their heads to watch us, and as we passed they would look to the front again to watch us going on into the snow.

A KAZAK AND HIS GOLDEN EAGLE

These magnificent birds, which are captured with great peril from their nests among the crags, are powerful enough to bring down gazelles, roe deer, and even wolves, but their most valuable quarry is the fox. A good eagle is worth more than the best horse; but it is rarely sold, being reserved as a present of great honor or tribute to a tribal chieftain (see, also, text, page 689).

A BLIZZARD SWEEPS DOWN UPON US

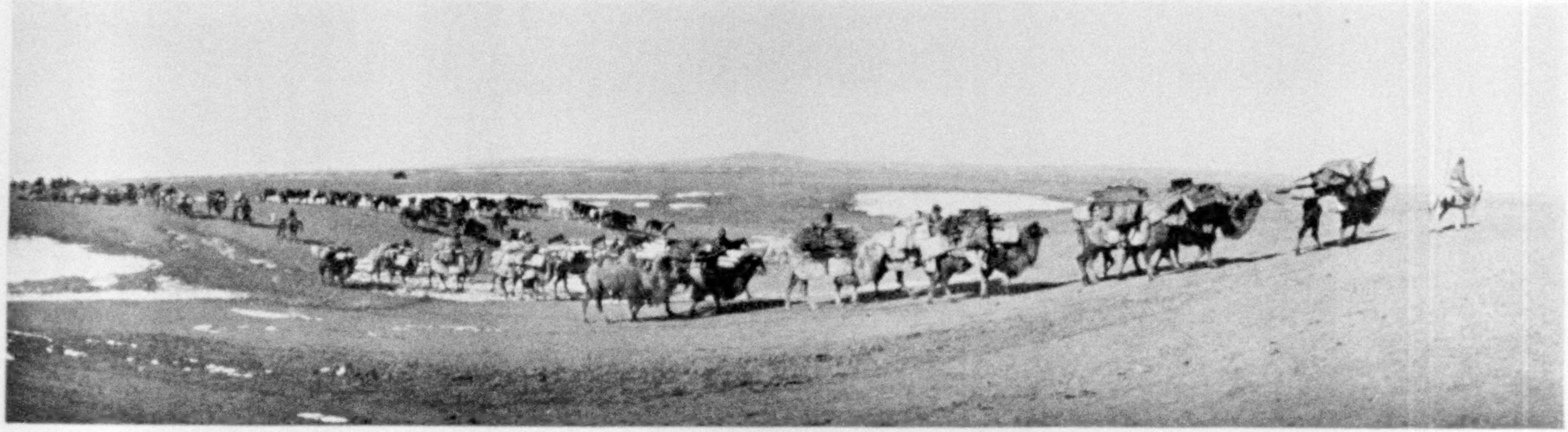
We struggled for more than 20 days against head winds and deep snow before reaching Kuchengtze, and the worst day



Photograph by Eleanor Lattimore

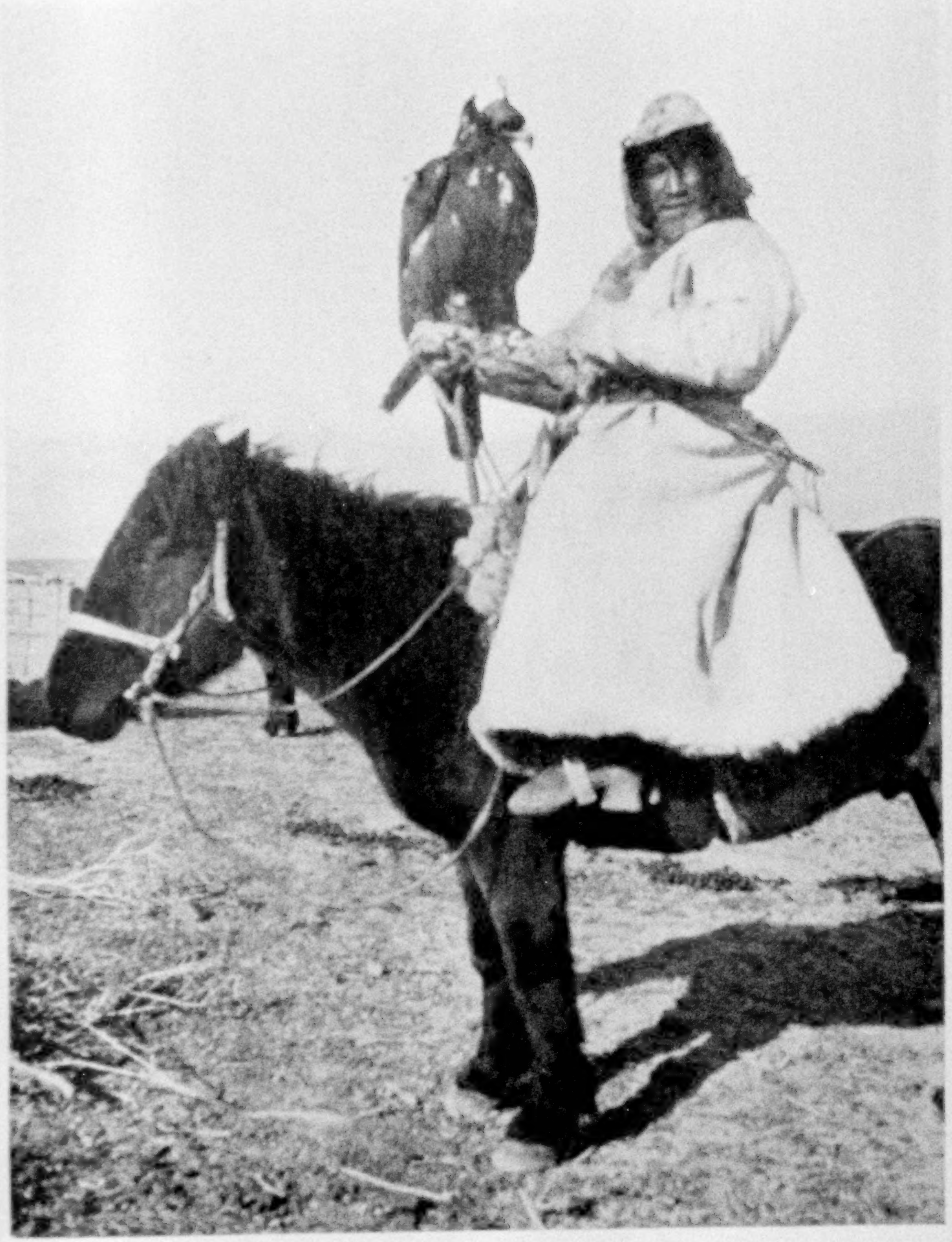
TRAILS CONVERGE IN OLD WINDY MOUTH PASS

In the distance is a caravan of Kazaks on their spring migration, plowing across the snow in search of grazing grounds blown clear. In the foreground the heavy, two-wheeled carts of the author's party, each drawn by five ponies, are making slow progress through the drifts. This crossroad of nomads and carters is in northern Sinkiang.



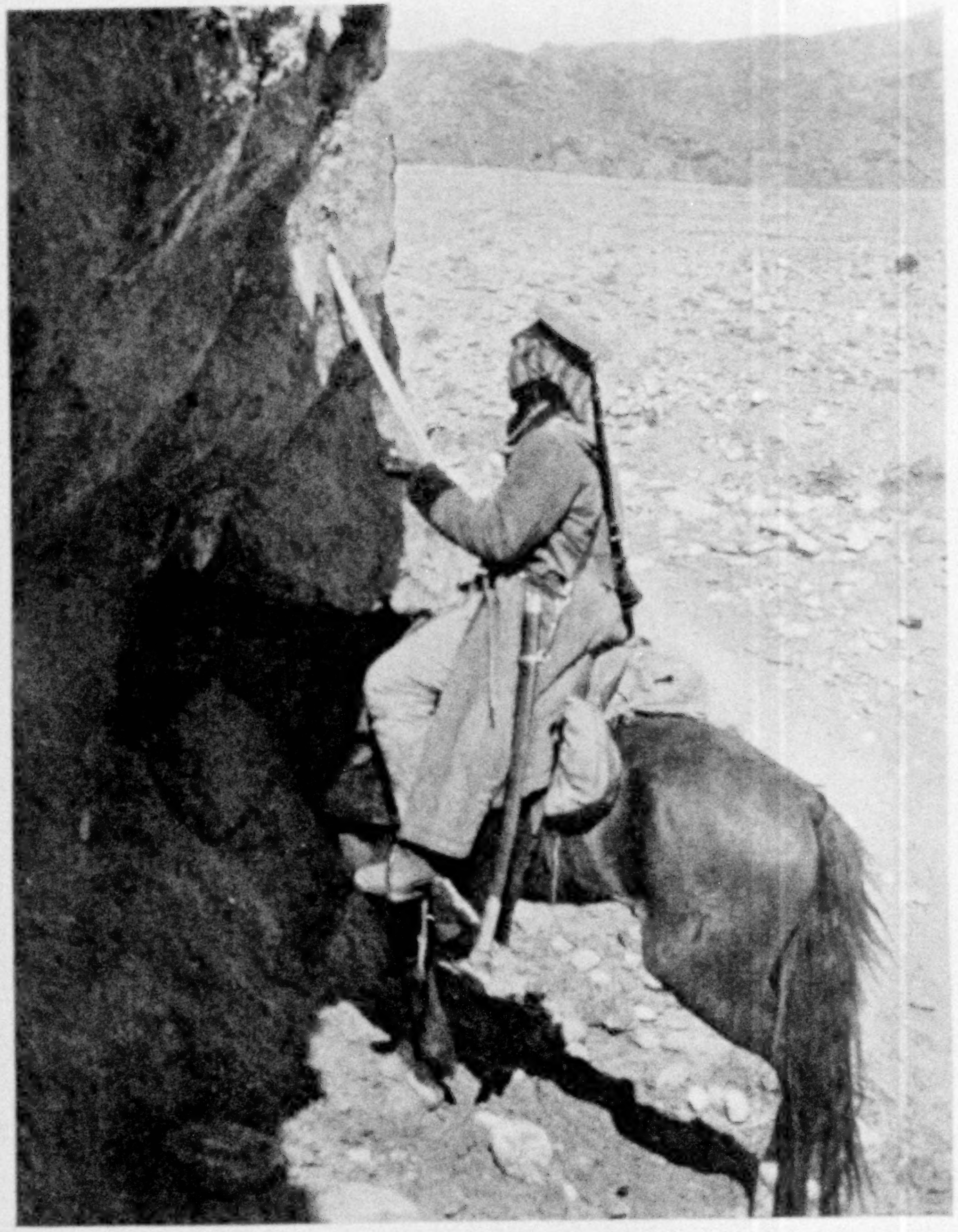
THE TORGUT MONGOL'S PACK BEAST CARRIES ALL HIS MASTER'S BELONGINGS

On top of two of the loads in the picture are strapped baby camels. These people are descendants of the tribe which accomplished one of the last of the great historical migrations, marching, in the 17th century, 3,000 miles to the lower Volga, only to journey back, 70 years later, to Sinkiang at the invitation of Emperor Kien Lung. The reason for the return was their failure to establish satisfactory relations in Russia.



FALCONRY IS THE PRINCELY SPORT OF CENTRAL ASIA

With his eagle perched on a crutch resting in his stirrup, this Mohammedan nomad of the Barkul Range is ready for the hunt. His helmet-shaped bonnet and high-heeled boots identify him as a Kazak.



HE STRIKES THE ROCK, BUT NOT FOR WATER

This Kirghiz soldier of the Chinese service is hacking off bits of crystal from a solid cliff of salt near a hamlet on the southern side of the Muzart Pass. He was the author's escort on this stage of the journey.

THE AUTHOR ENJOYS WAYSIDE REFRESHMENTS

Kazak women at an encampment passed on the day's march have proffered the traveler a bowl of sour milk, a desert delicacy. Hospitality of this sort is general among the nomads; but, though they never ask payment for food or drink, they are inveterate beggars and are delighted with any small gift. The grandmother at the left is spinning woolen yarn through her fingers to a weighted wooden spindle.

of all began with a morning that was still and fine. In the middle of the forenoon a little breeze sprang up. In ten minutes it was a full blizzard. Overhead we could see faintly that the sky was still blue and unclouded, but across the snowy plain the wind rushed with appalling velocity, driving a barrage of dry snow before it.

Our camels were a mile or so away, feeding. The man with them managed to string them together in a line and lead them back to camp, crawling most of the way on his hands and knees, because it was impossible to stand against the wind. By the time he got in, his face, neck, and chest were coated with ice. We succeeded in digging a hole in a snowdrift and in it made the camels kneel. The wind quickly piled snow on top of them, and this covering afforded some protection against the worst of the cold.

Right through the double cotton canvas of our tent the snow blew, stinging us like needles, until some time after dark. Then the wind died as suddenly as it had begun, and there fell a weird hush. We were so cold that we dared not sleep.

We sat up till dawn, and at the first

MELON MERCHANTS OF SINKIANG DO A LIVELY BUSINESS

Grown in enormous numbers and bewildering variety on newly irrigated desert land, these fruits, which extract from the soil salts injurious to other vegetation, acquire amazing lusciousness (see text, page 700). They can be cut into strips and dried for winter use, the heat of the sun being so intense that they are dehydrated without a trace of rot.

sign of light we dug out our camels—one of them had to be lifted to its feet by three men—and cleared out of that place. The tent was so stiff with ice that it could not be rolled or folded and had to be draped over a camel.

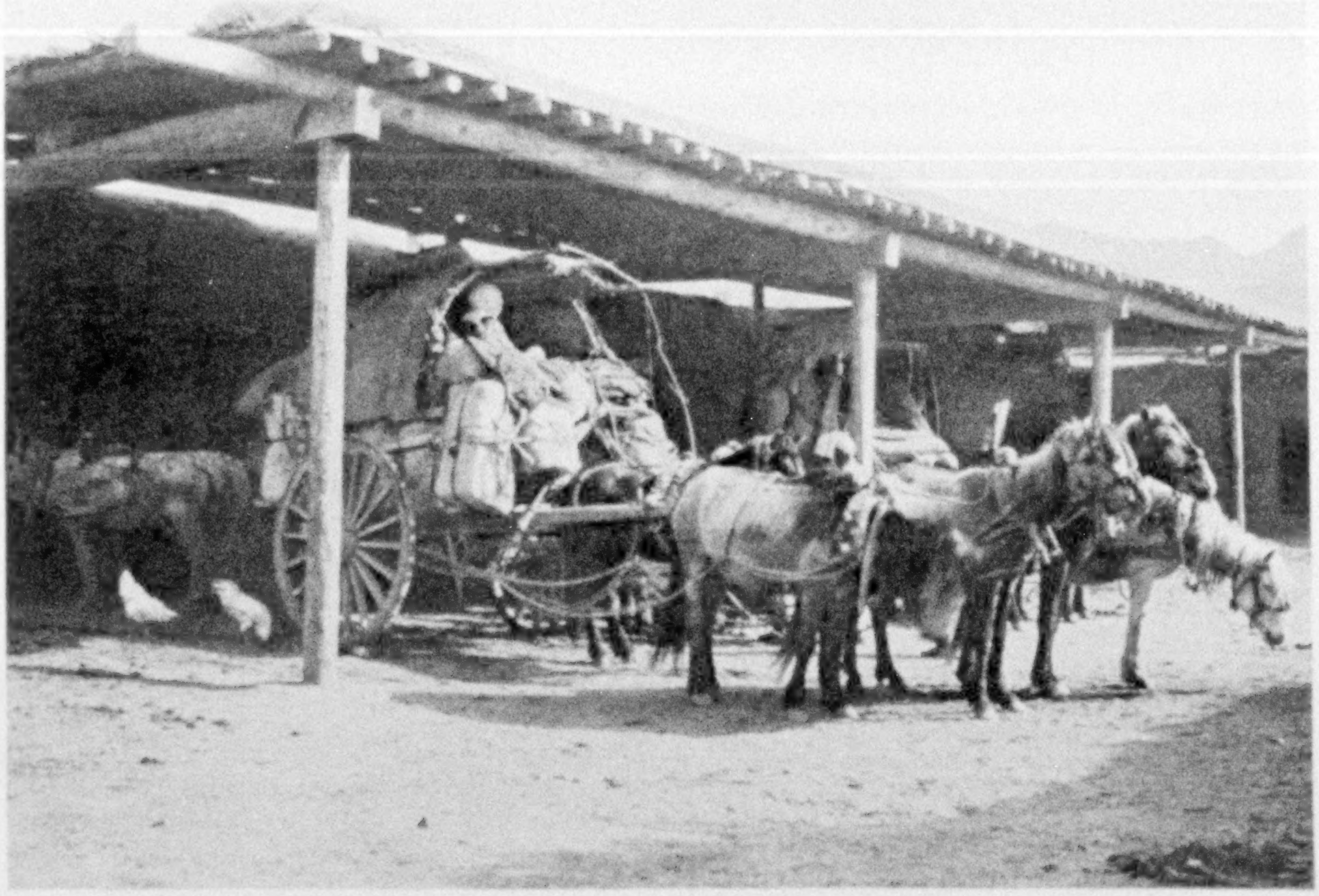
We had scarcely started when the wind began again; but this time we were only on the edge of it, and got away.

A few days later, having completed the journey of more than 1,600 miles in a little more than four months, we entered the gates of the walled city of Kuchengtze.

Traveling day and night in a cart carrying the mails, I covered the remaining 150 miles to Urumchi in three and a half days.

At the latter place I stayed for a month trying to get a wireless message to my wife in Peking. The time consumed in persuading the radio to function was typical of Chinese Turkestan, the province farther from the sea than any other country in the world, where life has remained unchanged for centuries, and the few conveniences of the modern world seem accidental and out of place.

The wireless was installed a number of years ago by a Western company, under



THE ARABA IS USED FOR LONG-DISTANCE TRAVEL

This huge two-wheeled cart can be adapted as sleeping quarters. Such high and lumbering equipages are common on the Great South Road of Sinkiang.

contract with the Chinese Government. Ever since then the supply of spare parts for repair and replacement has been held up by civil wars in China. The plant is constantly breaking down and having to be patched up with whatever crude materials can be found in the province. Even so, radio is the quickest form of communication with the outside world.

The postal service, directed by a foreign commissioner in the employ of the Chinese Government, is efficient, though slow. By relays of couriers it gets the mail out to Siberia, whence it is carried by rail to China, and reaches Peking in about a month.

THE TELEGRAPH IS CALLED "CAMEL LIGHTNING"

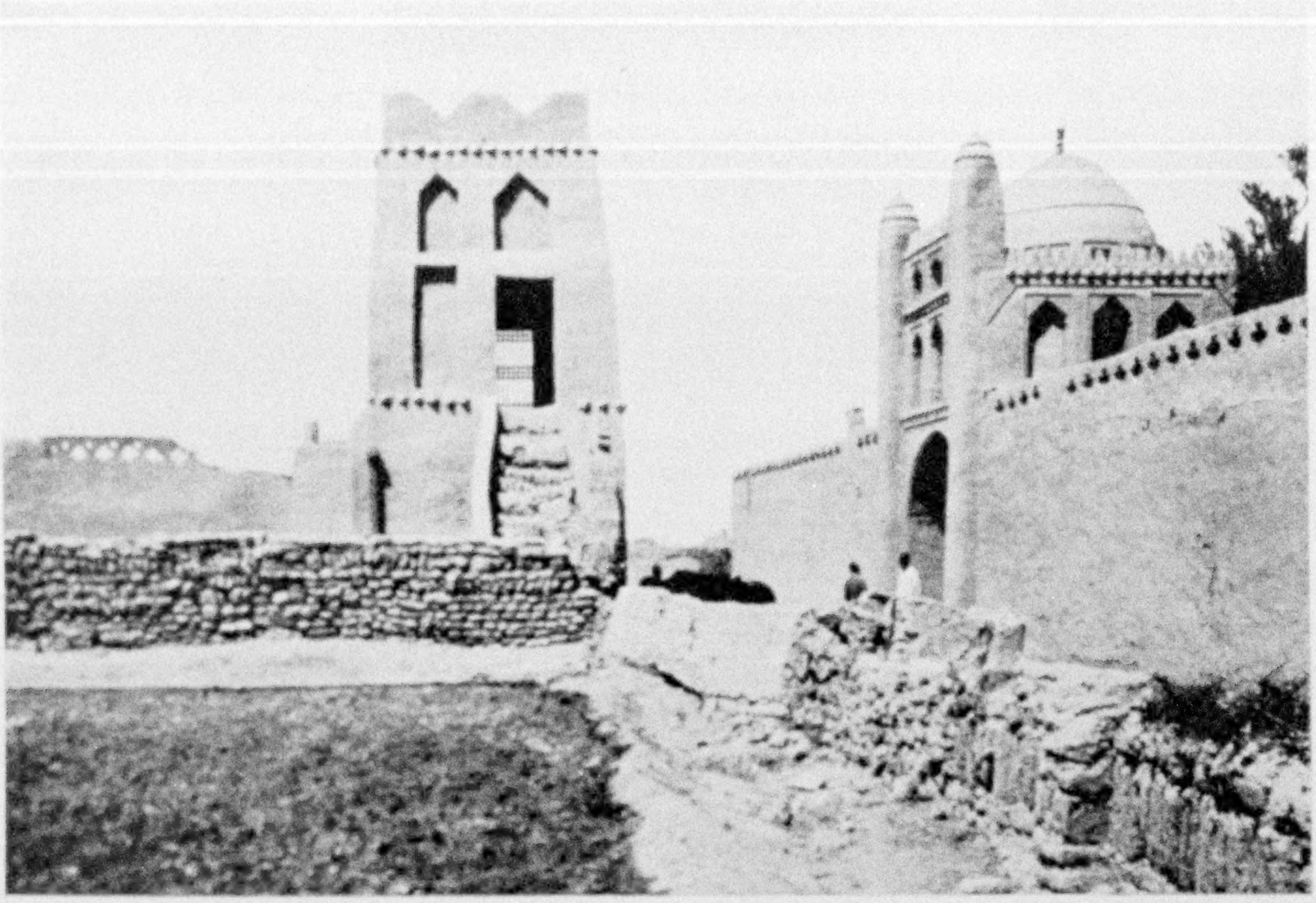
The ordinary telegraph is hopeless, because the lines are constantly being cut during civil wars or commandeered for military use. It takes, on an average, from three to six months for a telegram to reach the outside world from Chinese Turkestan, and it is with some reason, therefore, that the telegraph service is known throughout the province as the "camel lightning."

One reason for the slow working of the wireless is the rigid censorship enforced by the Governor to prevent its use for political purposes. The post, although allowed to function as effectively as possible, is also censored. All private mail is censored, and every reference to political news is destroyed.

No newspapers are permitted to enter the country, and none may be published; in fact, in the whole province, which is roughly equal in area to France, Germany, and Spain combined, the only printing presses are those which manufacture the Governor's paper money.

By such methods the province of Sinkiang, or Chinese Turkestan, has been kept peaceful, contented, and prosperous ever since the Chinese Revolution in 1911, although every other province of the country has been ravaged by civil war and banditry.

The Governor, who has built up such a remarkable record in ruling the province, is more than 70 years old. Although, as



LITTLE REMAINS OF THE WALLED TOWN OF TOKSUN

After the Mohammedan rebellion of half a century ago, many of the Tungan strongholds were demolished. The tower at the left and the mosque at the right are almost the only buildings left standing in this city near Urumchi.

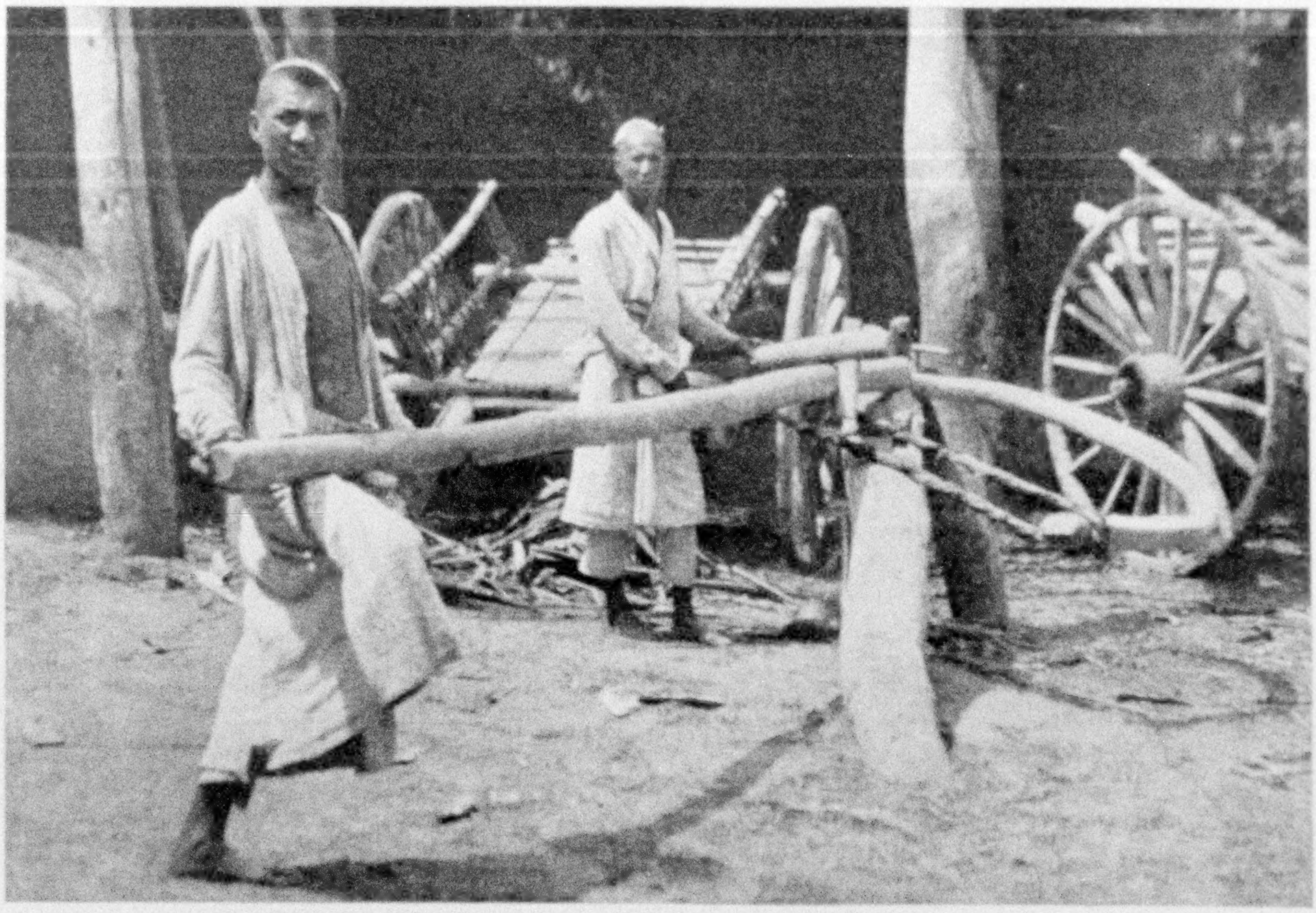
a successful despot, ruling a vast province peopled by numerous different races, many of them savage and difficult to control, he employs thoroughly practical methods and is intellectually a conservative.

One example of his old-fashioned sympathies is the great trust which he reposes in his brother, who, like a medieval magician, is skilled in interpreting dreams and the courses of the stars. The Governor's son, who was absent in Peking at the time of our visit, was reported to have a cold, or a touch of influenza. The Governor hastened to consult his brother; the brother consulted the stars; and the results, together with suitable prescriptions and advice, were wirelessed to Peking.

A MESSAGE GETS THROUGH TO MRS. LATTIMORE

At last I got a message through to my wife, and I received a reply saying that she was starting out through Siberia to join me. Because the country to be traversed was totally unknown, and there was considerable uncertainty about getting through, she and I had agreed originally that it would be best for me to attempt the journey through Mongolia alone and send her a message as soon as I reached Chinese Turkestan. I had hoped to reach Urumchi in the late summer and notify her in time for her to travel the 300 to 400 miles between the end of the Siberian Railway and the border of Chinese Turkestan by the Russian motor-car service, which does the journey in about three days.

As things turned out, she had to travel in February, the very coldest season of the year, and the motor service was, of course, held up by deep snow. From Peking she used the Chinese railways into Manchuria to reach the Trans-Siberian Railway, by which she traveled to Novo Sibirsk. Then she took a branch railway south to Semipalatinsk, capital of the Province of the Seven Tents. She had then to complete the journey by traveling 17 days by sled through the deep Siberian snow under appalling conditions (see map, page 664).



LITTLE TREES ARE WROUGHT INTO CART WHEELS

These wheelwrights at a village near Aksu heat poplar saplings in ashes, bend them into semicircles by twisting bark ropes attached to the ends like bowstrings, and lash them together in pairs. Though the hoops thus made tend to be more elliptical than round and are not tired with metal, they serve excellently for traffic on roads of soft earth. More expensive seasoned wood, studded with nails, is used for vehicles intended for use on long journeys.

She was able to make the journey only because the Soviet authorities gave her special permits to travel in Siberia off the beaten track, where foreigners are not usually allowed. However, the officials disappointed us in one thing: They would not allow me to enter Siberia to meet her at the end of the railway.

Heavy snow and violent weather had delayed the mails and broken down the telegraph wires; and when she started on the sleigh journey, she did not even know whether she would find me at the end of it. She traveled with a train of 14 sleds, which was carrying matches to Chinese Turkestan.

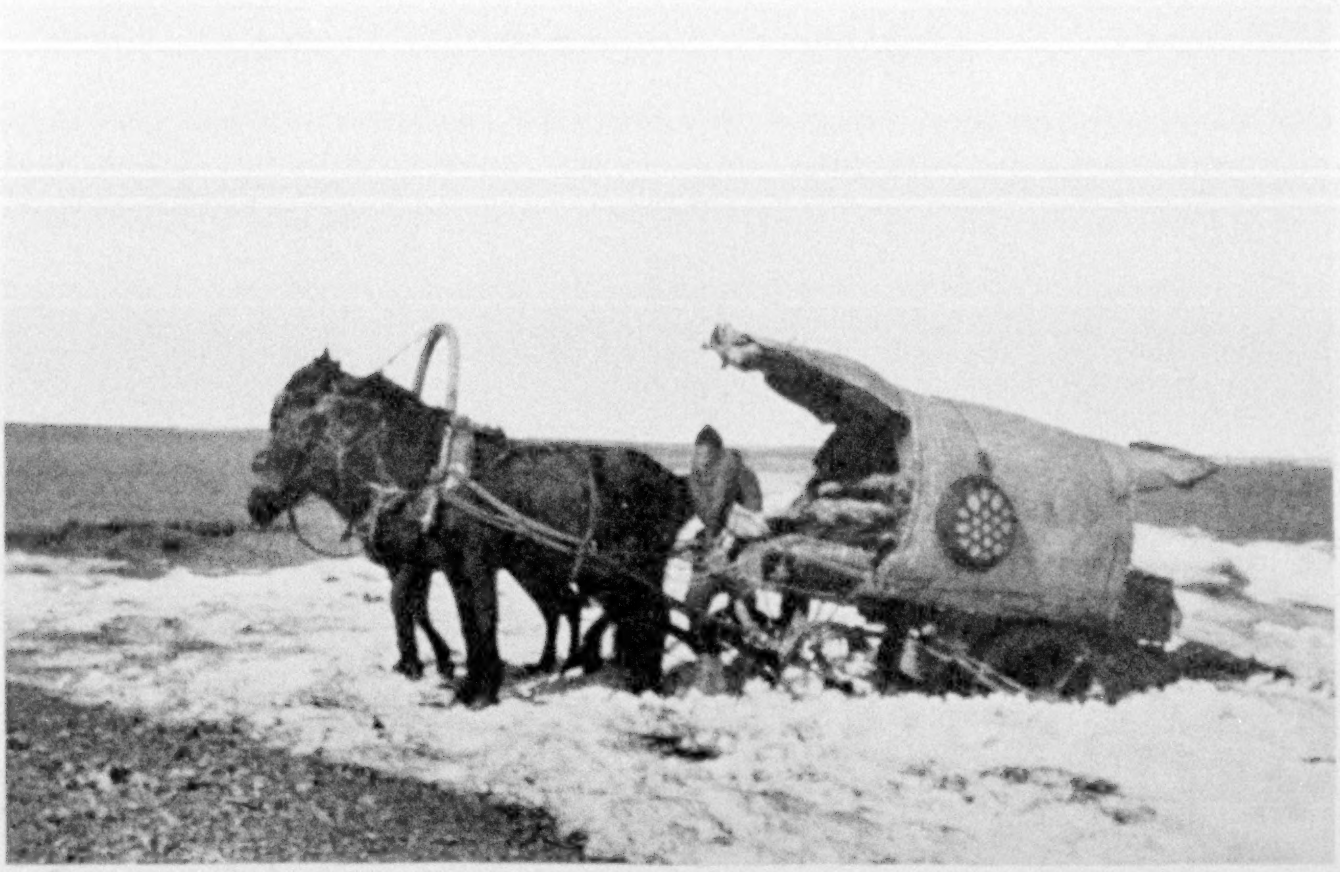
The sleds were in charge of five Siberian drivers, and Mrs. Lattimore was accompanied by a young Chinese, a courier from the Chinese Consulate at Semipalatinsk, who acted as her interpreter, and whose presence seemed to promise a certain degree of safety. During the whole of this rough journey she lived on the coarsest food—tea, frozen bread, and mutton—and slept in Kazak huts buried under the snow. It was a remarkable journey for a woman to make alone.

Meantime I traveled about 400 miles from Urumchi to Chuguchak, on the border, and at the latter place my wife and I met in the first days of March, 1927. We then traveled more slowly back toward Urumchi over the Great North Road, using carts as means of conveyance.

The key to the geography of Chinese Turkestan is the great range of the Tien Shan, or Celestial Mountains, which run roughly east and west. Skirting this range, one on the north and one on the south, are two great trade routes, natural lines of communication which have determined the history of central Asia during hundreds of years.

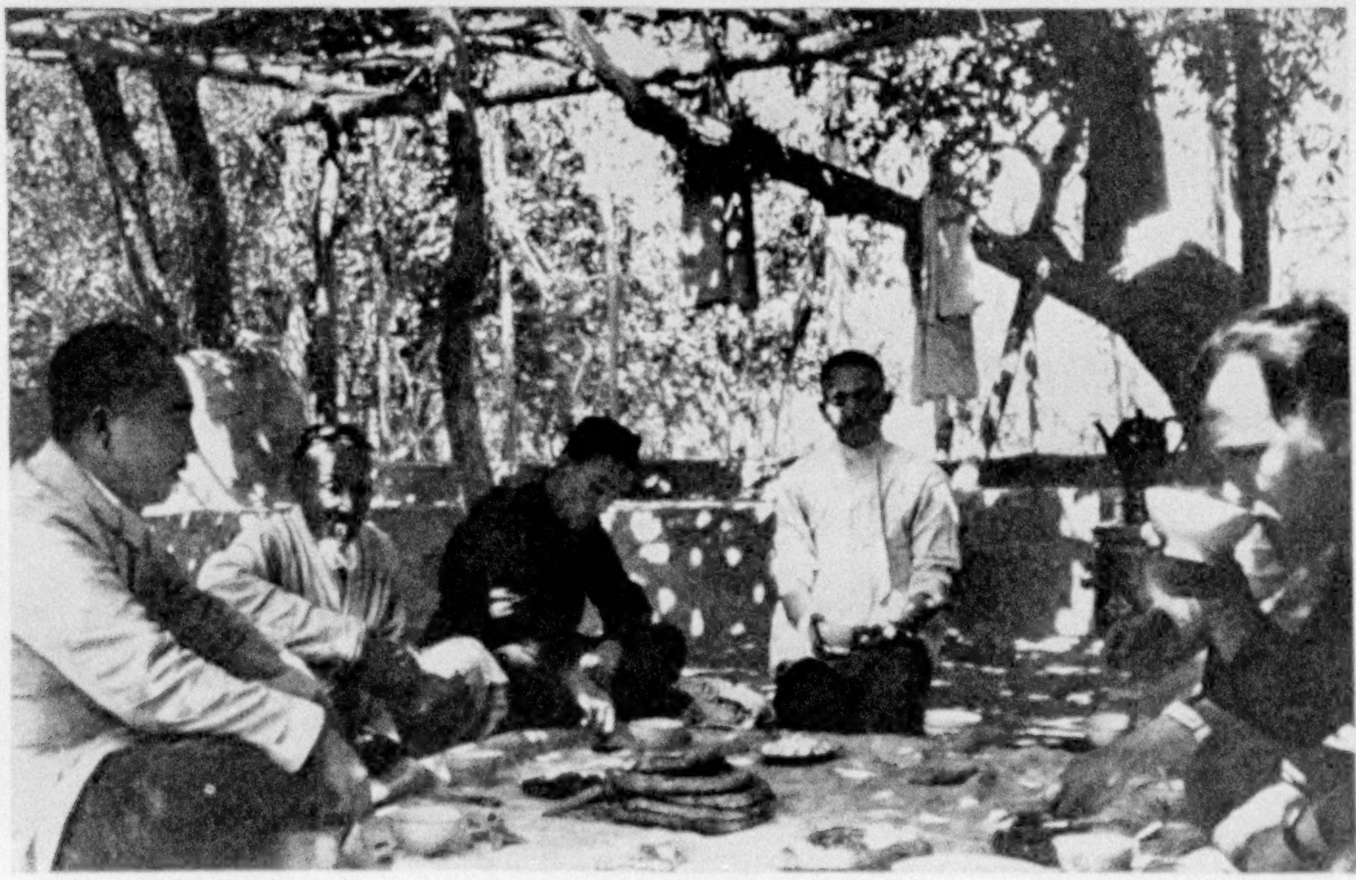
EACH OASIS HAS ITS TRADING CENTER

The province is largely desert. Away from the mountains the rainfall varies from little to less, and agriculture depends on rivers which flow down to the plains



A REMNANT OF WINTER ENSNARES THE AUTHOR'S CART

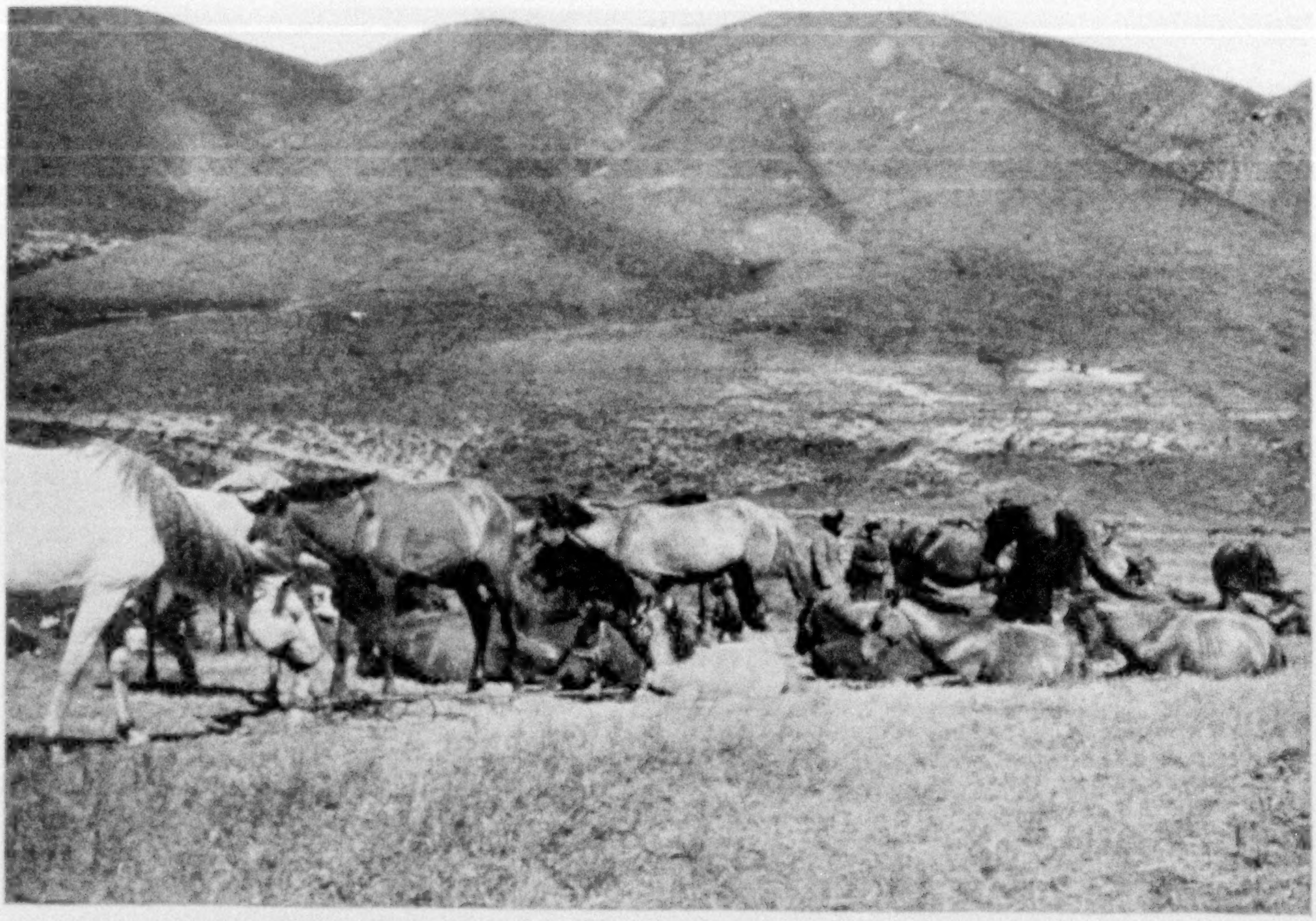
Though the snow has melted from the open desert, it lies deep in hollows like this, a trap to vehicles. This flat, dreary, gravel-covered desert intervenes among oases of the Great North Road of Sinkiang from Chuguchak to Urumchi.



Photographs by Eleanor Lattimore

A GRAPE ARBOR NEAR TURFAN MAKES AN IDEAL PICNIC PLACE

Here, under a grapevine several hundred years old, is spread a feast consisting of flat loaves of Turki bread and a *pilaf* of mutton, rice, and carrots. The author, at the extreme right, is the guest of the owner of the vineyard, second from the left, an 80-year-old veteran of the wars of Yakub Beg.



EVERY CAMP HAS ITS HERD OF MARES

These ponies belong to the chief of the Alban tribe of the Kazaks. They are "Ili horses," one of the most celebrated central Asian breeds. Their milk is fermented in coltskin bags to make kumiss, a mildly intoxicating drink of which the nomads are extremely fond (see text, page 694).

from the snows and ice of the mountains, and end eventually in marshy, salty swamps in the deserts.

Where the rivers reach the plains, the water is carried out to each side by irrigation canals to form oases. These irrigated spots are populated by farmers, and there is a town in the middle of each oasis which serves as a trading center.

If one were to follow up a typical river, one would find first a desert barrier range of hills. Passing through this by a gorge one would come to the high central Celestial Mountains. In these mountains are different zones, according to the altitude: a lower grazing zone, the winter quarters of nomadic tribesmen with their flocks and cattle, a forest zone, and an upper, or summer-grazing, zone. All through the mountains are coal and valuable minerals. Thus the river valley, linking the mountains to the plain, forms a channel of trade.

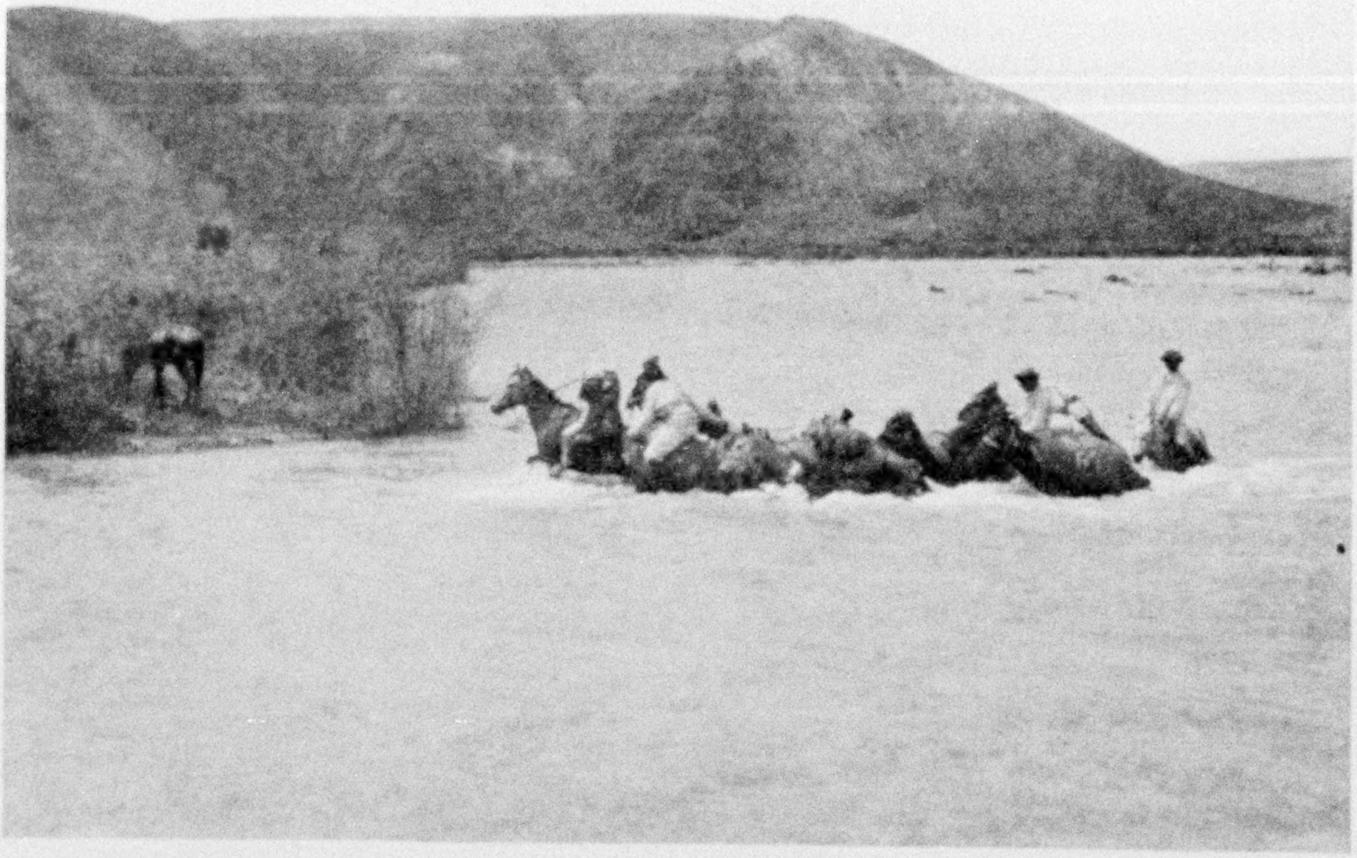
In the trading town at the center of the oasis, the cattle, wool, skins, lumber, coal, and gold of the mountains are exchanged for the grain, clothing, and crude manufactures of the oasis country and the town. Since each oasis is cut off from the next by a belt of desert, the main tendency of trade is to go up and down between each oasis and its own background of mountains, rather than back and forth between the oases.

The only difference between the North Road and the South Road is that along the North Road the mountains are more productive, because the greatest rainfall is on the northern slopes.

A CHINESE DOMAIN, BUT COMPARATIVELY FEW CHINESE

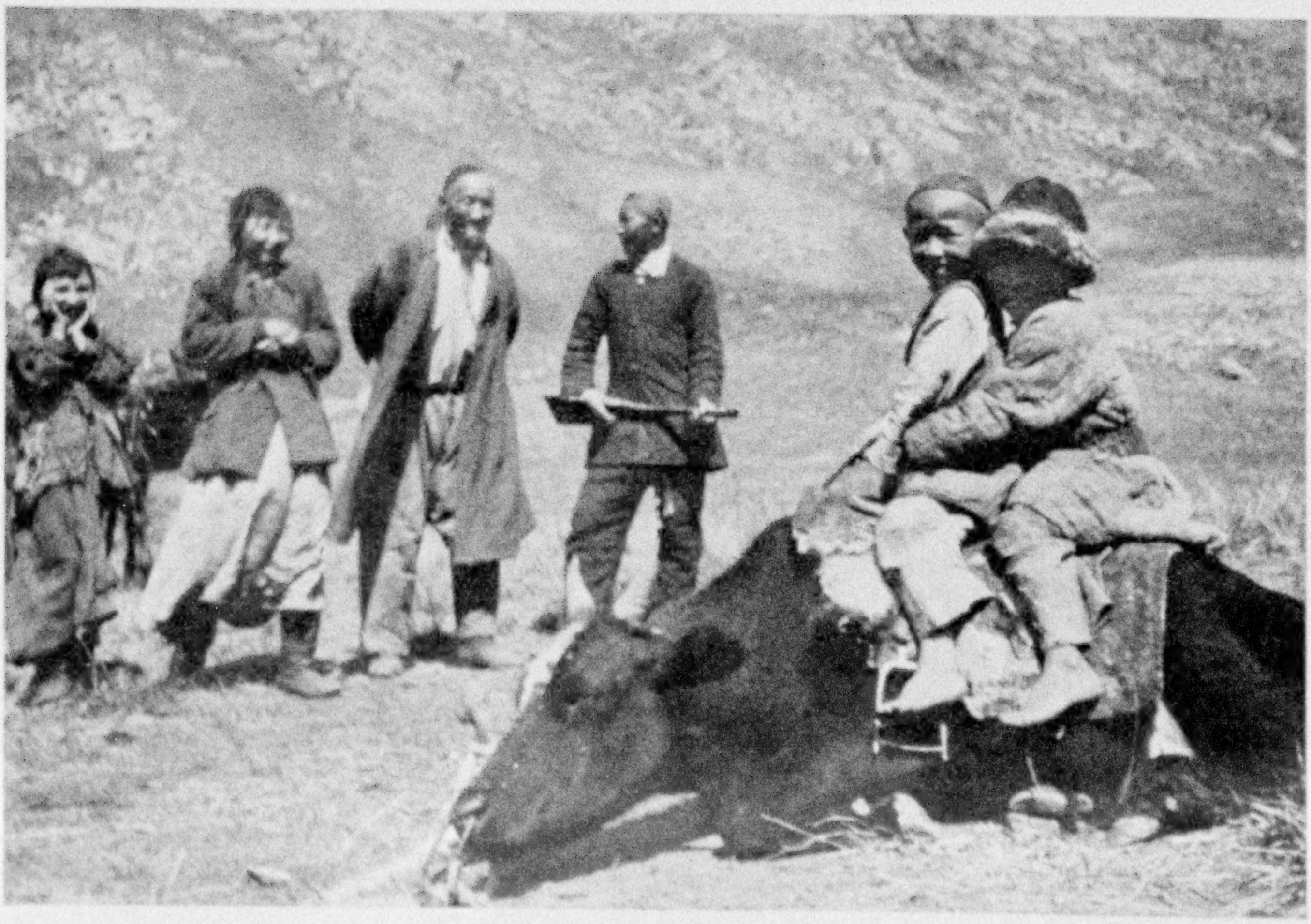
The tendency of trade to remain localized between each oasis and its own mountain background has been one of the most important factors in keeping Chinese Turkestan behind the general development of the world, not only by making it possible and comfortable not to change, but by making change difficult.

The province is a Chinese dominion,



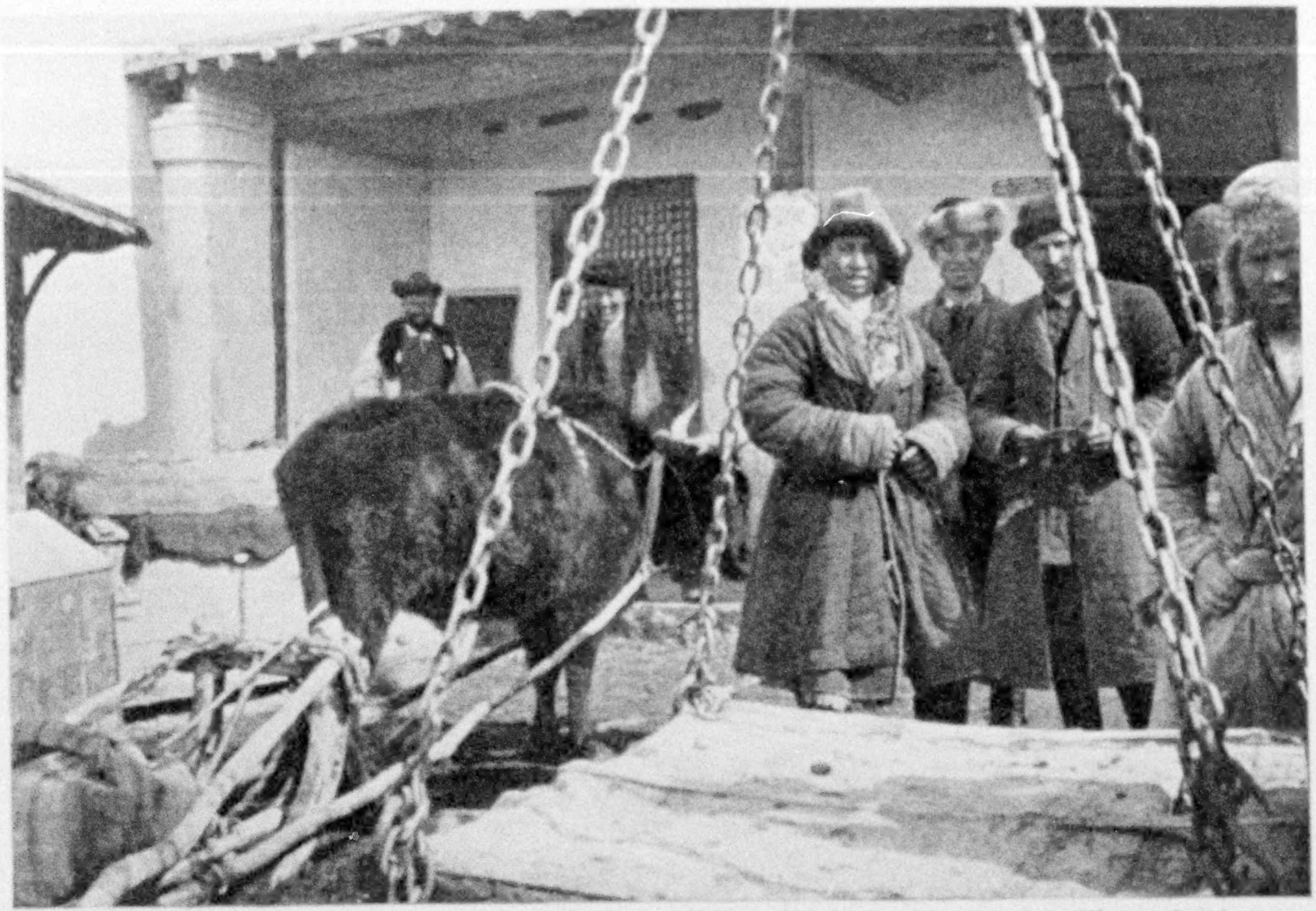
TO CROSS SUCH STREAMS IS PERILOUS ADVENTURE

Some of the author's pack ponies are swimming and scrambling out of a ford across the deep and swift Tekes River, one of the main affluents of the Ili, which waters a fertile valley system north of the Tien Shan.



THESE KAZAK BOYS' PONY IS A SADDLE BULL

The young man in the background is holding a triangular, guitarlike instrument, several types of which are found among all the Turki, Kirghiz, and Kazak peoples. The guitars are much like the balalaika of the Russians.



Photograph by Eleanor Lattimore

PASTORAL FOLK AND TILLERS OF THE SOIL MEET TO BARTER

In the public grain and flour market of Chuguchak, trading center of the Torgut Mongols and western Kirei-Kazaks, the tribesmen exchange wool and the skins of wild animals for grain raised by immigrant Chinese and Turki colonists, settled in the shelter of the walled city. The traffic brings together representatives of two early stages of economic development.

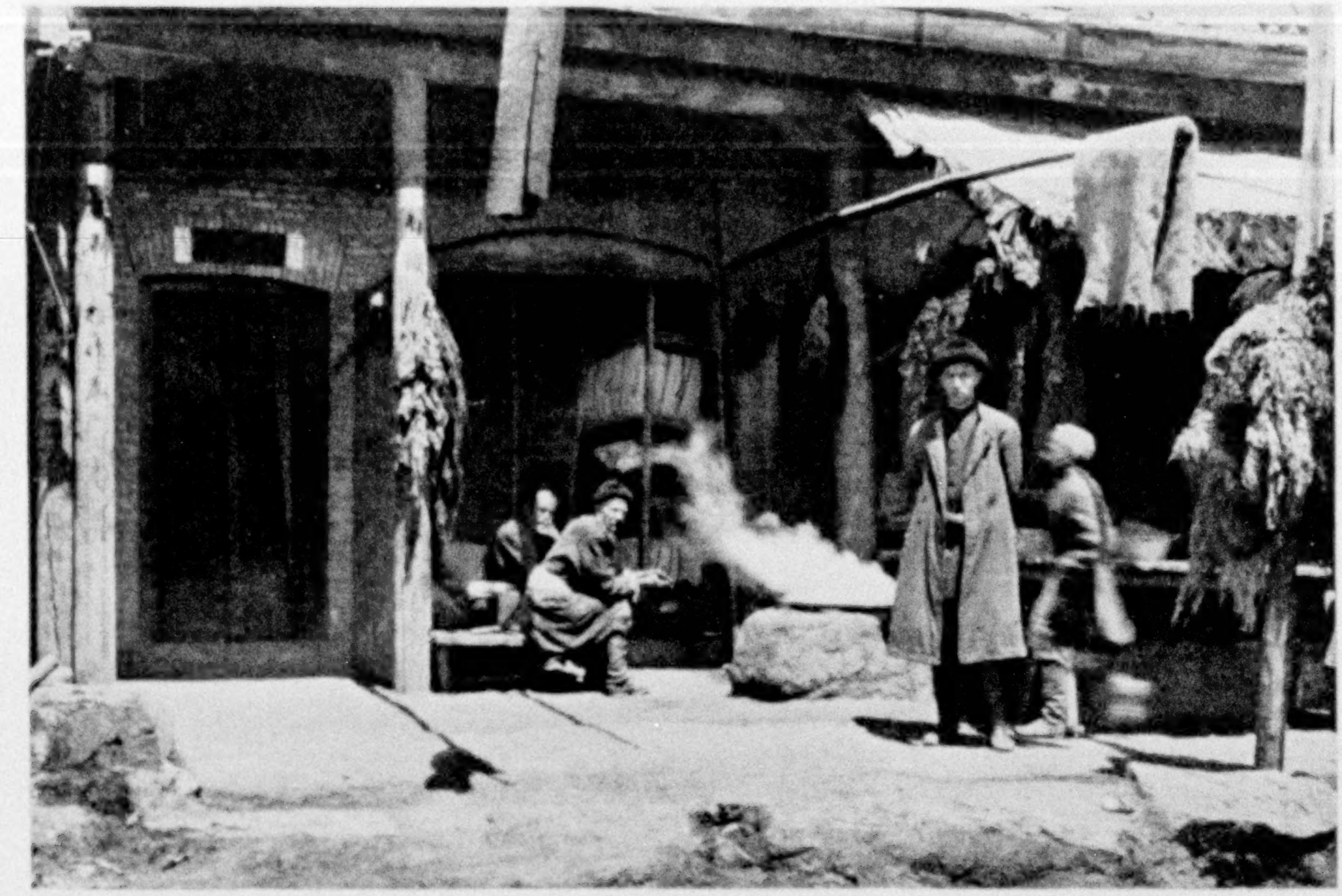
but the vast majority of the varied population is not in the least Chinese. In a few areas of the North Road the Chinese have settled as farmers; but in most places on the North Road, and everywhere on the South Road, they are only merchants and officials.

The two most important settled peoples are the Tungans (often called the Dungans) and the Turkis. There are also numerous other tribes, including Dulanis, Tajiks, Kirghiz, Torguts, Chahars, and Kazaks.

As we returned from Chuguchak toward Urumchi, we passed great numbers, both of Kirei-Kazaks and of Torguts, who were migrating from their lowland winter quarters toward their summer pastures in the Tarbagatai Range. They presented a striking example of the brute strength and power of resistance to cold and hardship required of a nomad people. To force a way through the snow, they drove their pony herds before them to trample out a rough road. Then came oxen and cows, every one of them laden, some with felts and household furniture (see page 675). Some served as saddle beasts, and often a baby would be strapped in its rough cradle on top of a load.

The pony herd was in charge of the youngest and most active men, and the cattle were guided mostly by women. After them came more men, in charge of the camels, which floundered with difficulty through the frozen, slippery snow, often falling into drifts and having to be dug and hauled out. The camels, being the strongest and tallest of the animals, were laden with the poles and framework of the *yurts*, the round felt tents. At this time of year the baby camels, only a few months old, are unable to stand the hardship of long, difficult marches; each was tied on top of the load carried by its mother (see page 678).

Last of all came the great flocks of sheep, struggling and floundering through the snow. They were herded along by young boys and girls, riding young oxen



FELT DYERS PLY THEIR ART IN KULDZHA

To this important center of trade come the nomads from the Tien Shan, or Celestial Mountains. Hanging on the upright pole at the side is raw wool for making felts. A completed felt is suspended above, and in the steaming vat a mixture of dye is being cooked.

and ponies; and the saddle of every child was draped, fore and aft, with exhausted lambs picked out of the snow.

KAZAKS ARE GREAT EAGLE HUNTERS

The Kazaks excel the Mongols in their knowledge of hawks and hounds; and the old men carried valuable hunting eagles on their wrists, which were padded to protect them from the fierce grip of the claws. The arm bearing the bird was supported by a wooden crutch which rested in the rider's stirrup (see page 679).

These great birds are highly prized by the Kazaks. They are also used on the South Road by the Turkis. They must be taken from the nests, found in almost inaccessible crags. It is usually necessary to get above them and then lower a man by a rope—an enterprise demanding great courage, as the nest-robber, swinging on the rope, is frequently attacked by the parent birds.

A good eagle is worth more than two of the best horses. They are rarely sold, but are given as presents of great honor to chieftains and other notables.

From the time it is caught, the eagle is fed by hand on raw meat. It is first flown at game in the autumn of the year after its capture, and is then usually tame enough to return to a lure if the chase has been unsuccessful.

Eagles are flown at antelope and roe deer, and the Turkis claim that some birds are powerful enough to kill wolves unaided. The Kazaks use them especially in hunting foxes, because of the value of the fox pelts. Eagle and hound are sometimes used in the chase of the same fox. If the quarry reverses its course, to avoid the bird, it is overtaken by the greyhound.

Foxes and wolves, however, are not the natural quarry of these birds. To make sure that the eagle will attack the desired object instead of soaring off to hunt for itself, the owner starves it for days beforehand.

In striking at a fox, the eagle kills it not with beak, but with claws, which penetrate the skull at the back, killing the animal instantly without damaging the pelt. After the kill the bird, on the ground beside its quarry, is easily recovered by a

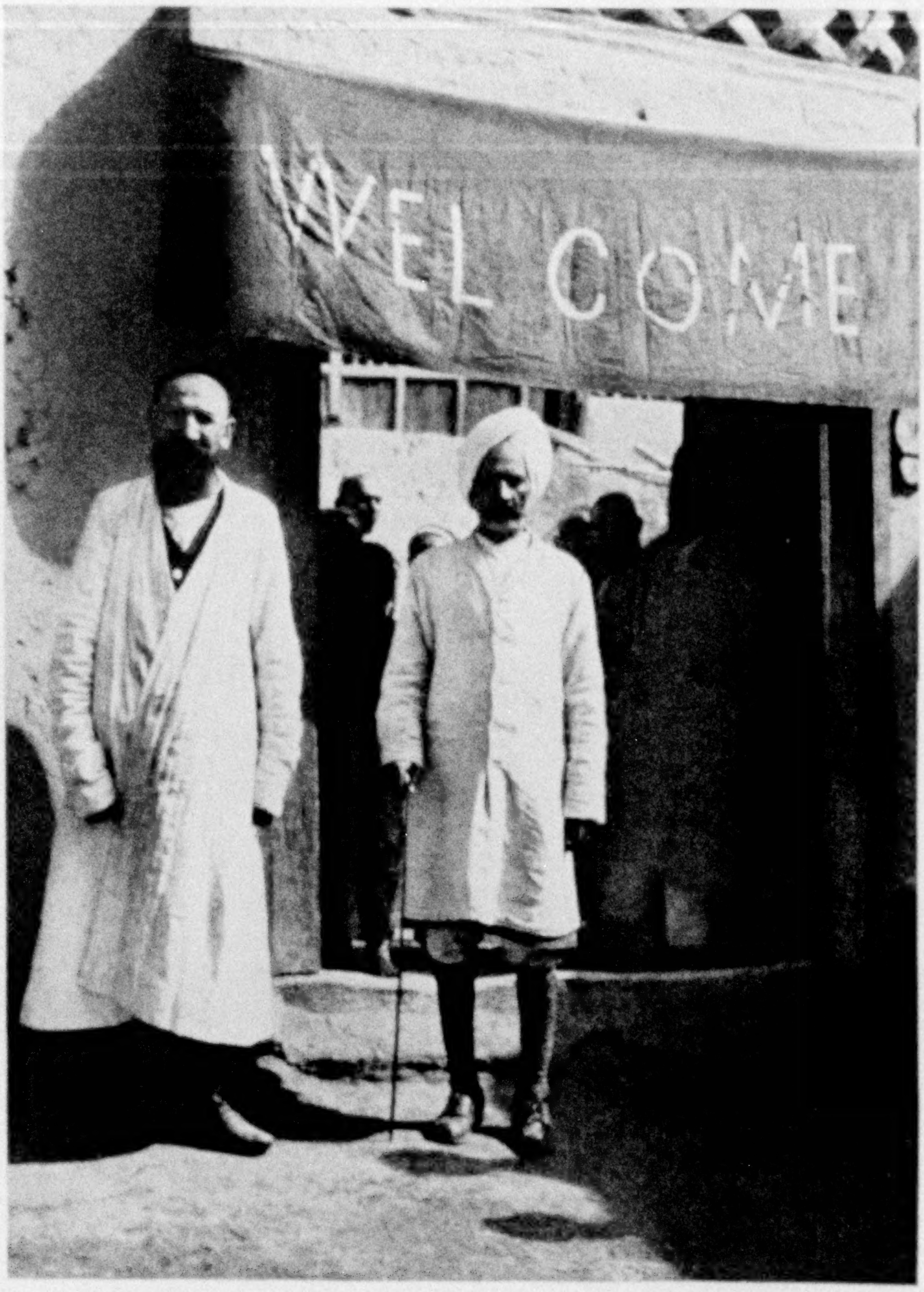
LADAKHI HORSESHOERS ARE SKILLFUL AND GENTLE

In contrast with the clumsy Turki and Chinese custom of lashing to frames animals to be shod, this method employed by the author's men on the trip over the high passes from Sinkiang into India is exceedingly humane. The pony was bred in the country about Lhasa.

MRS. LATTIMORE RESTS IN ONE OF THE CARTS

In two of these crude vehicles the party covered three stages between Yarkand and a town to the south, halting during daylight hours in the tree-shaded oases and traveling at night to avoid the overpowering heat of the August sun in the desert (see, also, text, page 699).

galloping horseman and is fed with raw meat as a reward.*



OFFICIAL GREETINGS ARE EXTENDED BY THE TURBANED GENTLEMAN

With the Chinese Governor's Turki interpreter at his right hand, the British headman of the Indian trading community at Karghalik, 36 miles south of Yarkand, is prepared to welcome "distinguished visitors." His town lies on the route of travelers from India, and the British Consul General from Kashgar visits it regularly to preside over lawsuits among the traders and money-lenders. Hence the headman's readiness to constitute himself a reception committee.

WE SHIFT FROM CARTS TO SADDLE PONIES

By the time we reached Urumchi, spring was at hand, and we no longer traveled by cart. Chinese Turkestan is noted for its mountain-bred ponies, the three most famous breeds being those of Barkul, of the Ili Valley, and of Karashar.

We purchased two beautiful ponies, paying the equivalent of $60 for one and $100 for the other. Thenceforward most of our traveling was done in the saddle, while the faithful Moses followed us in a cart.

After visiting Turfan, a curious depression below sea level, famous for its grapes and raisins and, to archeologists, for its ruins of ancient cities and evidences of ancient cultures, we turned again to the North Road to visit the Ili Valley, from which the Ili River flows into Russian territory, and ascended into the Celestial Mountains.

In 20 days, covering from 15 to 50 miles a day, we rode from Urumchi to Kuldzha, the chief city and center of trade of the Ili region. After a short stay, during which we were hospitably received by Chinese, Russians, and a German missionary priest, we assembled new transport and headed up into the Celestial Mountains.

After we had been ferried over the broad Ili River, we struck at once into hilly country and resumed the life of tent and camp. All our transport was in the hands of two cheery Turki pony men and a caravan of pack ponies, while we had our own fine mounts.

WE ARE RECEIVED AS OFFICIAL TRAVELERS

We were accompanied by two armed escorts detailed by the Chinese general, who controls the mountain tribes, to look after

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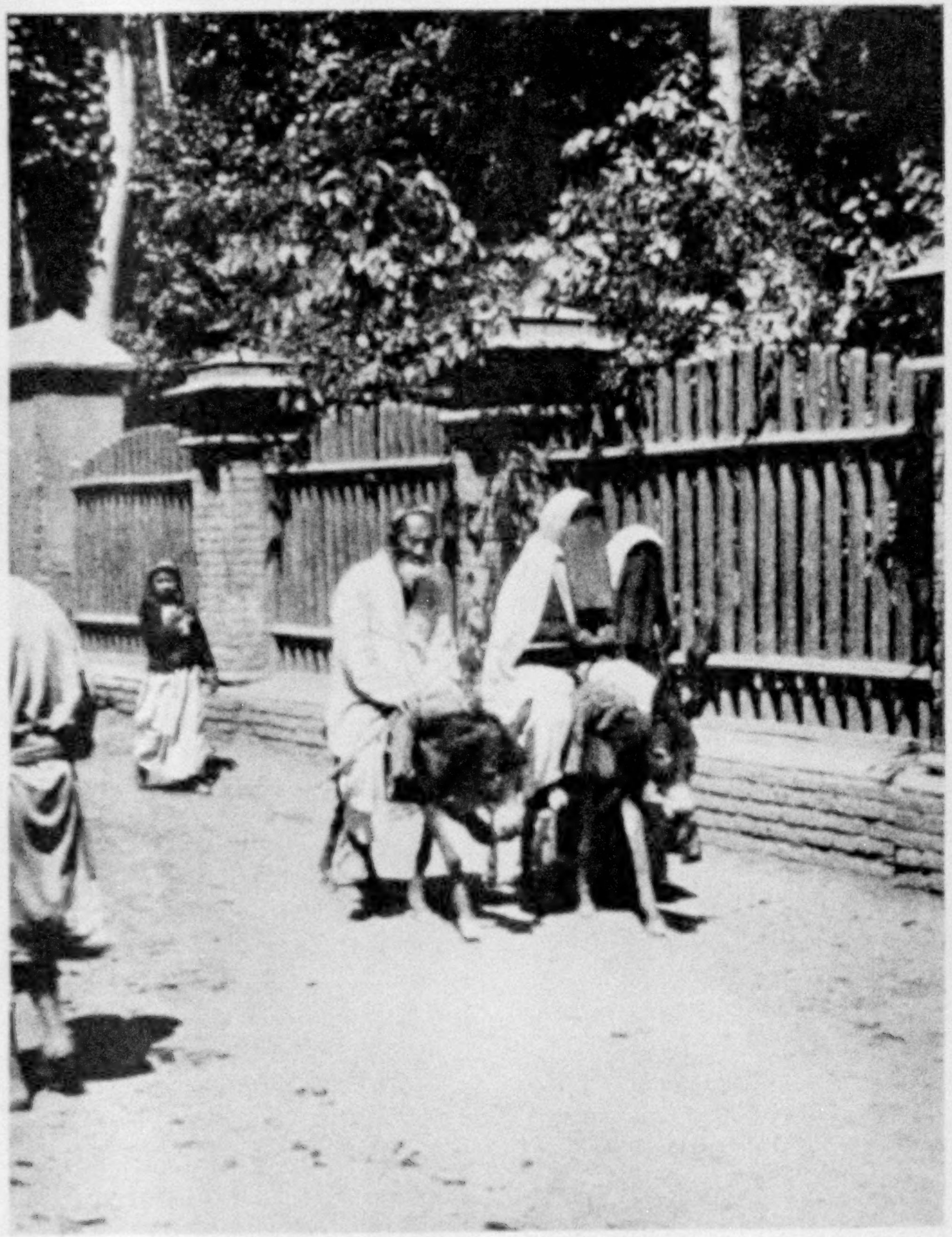
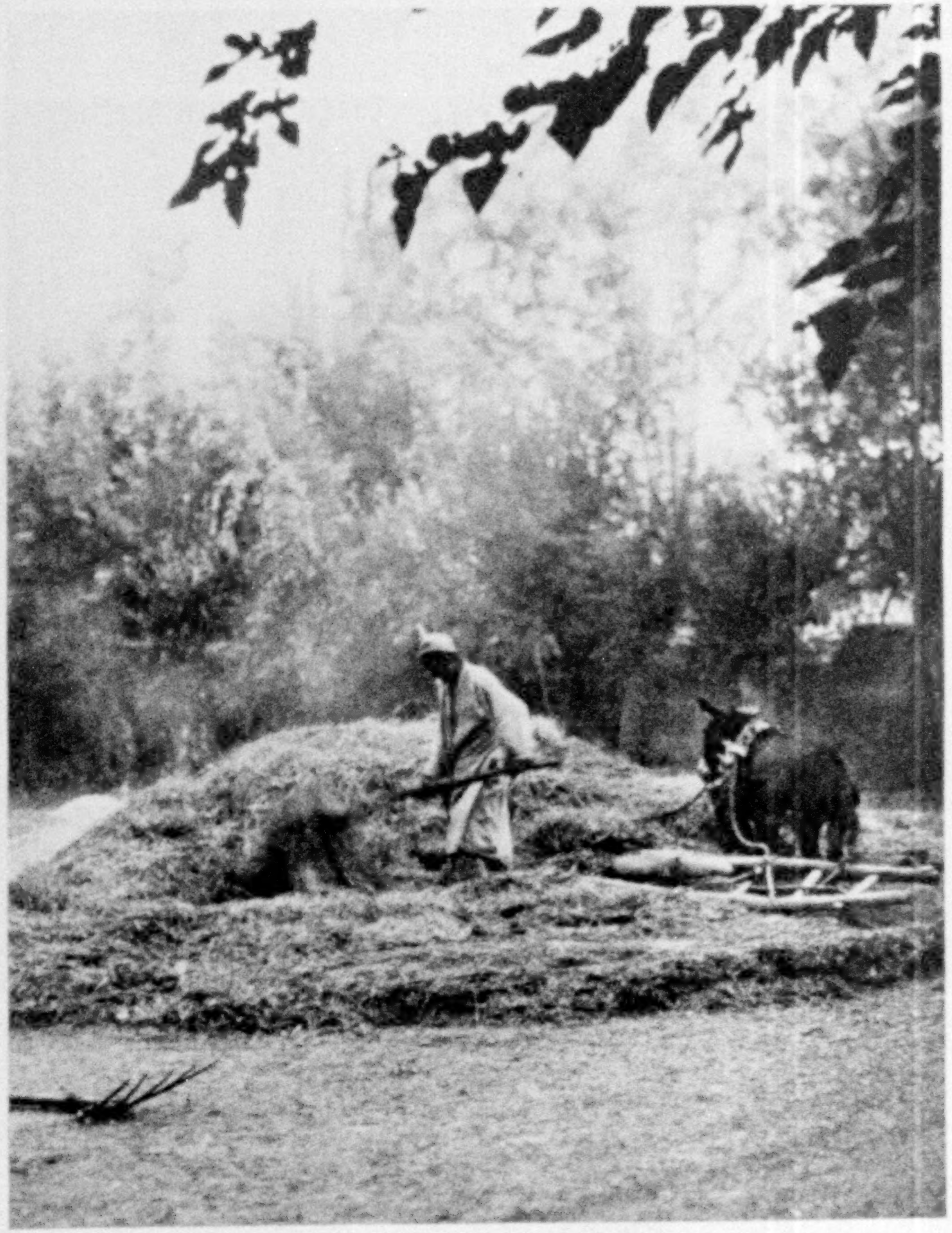
* See, also, "Falconry, the Sport of Kings," by Louis Agassiz Fuertes, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1920.



Photograph by Eleanor Lattimore

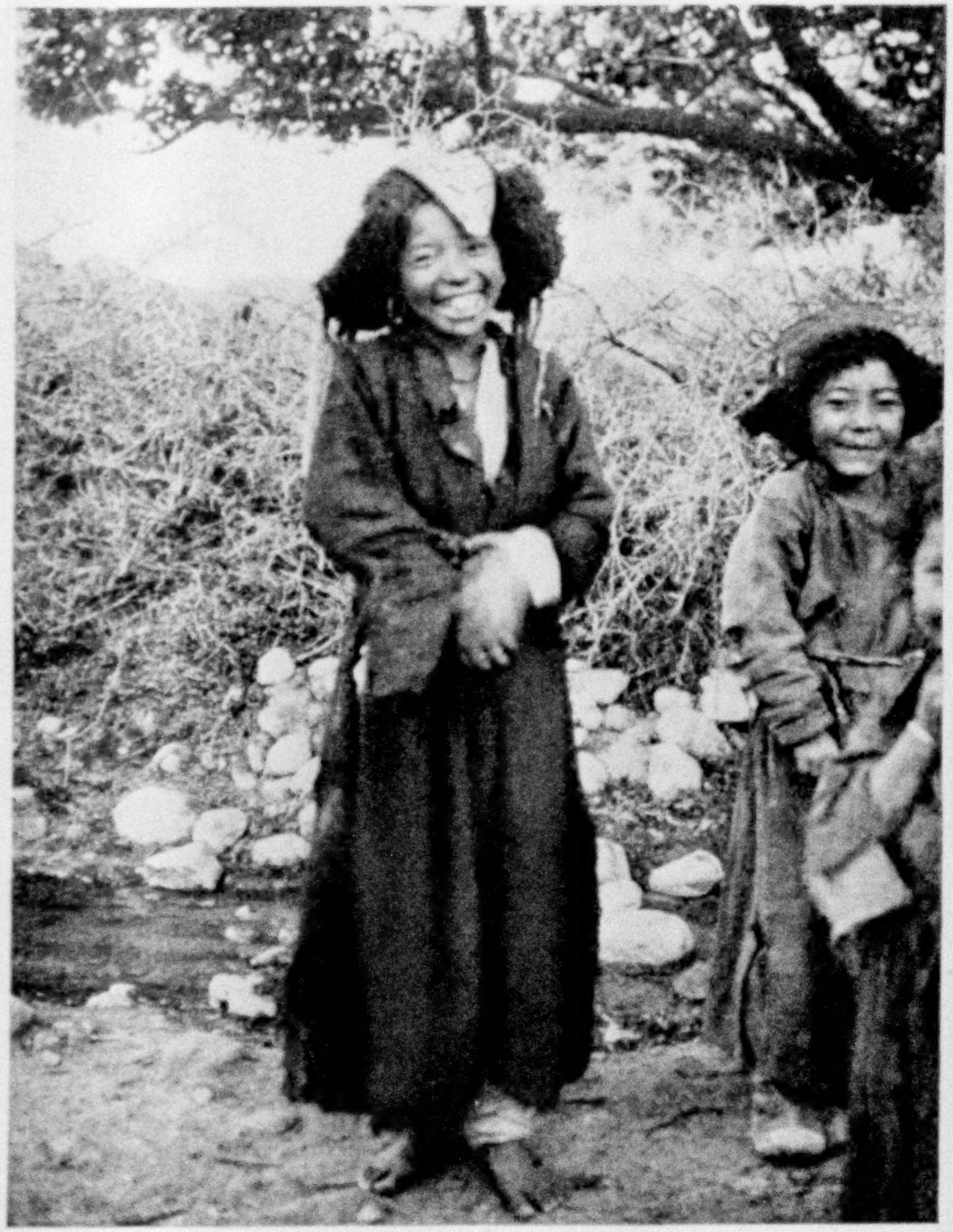
THE DIFFICULTY IS TO KEEP THE FEET OFF THE GROUND

An old Turki and his veiled womenfolk, coming to market in Kashgar, ride their tiny donkeys past the grounds of the old Russo-Asiatic Bank, which in Tsarist days was a center of Russian influence in Sinkiang. It has now been converted into a Chinese Government office.



UNMUZZLED, THE DONKEY TREADS OUT THE GRAIN

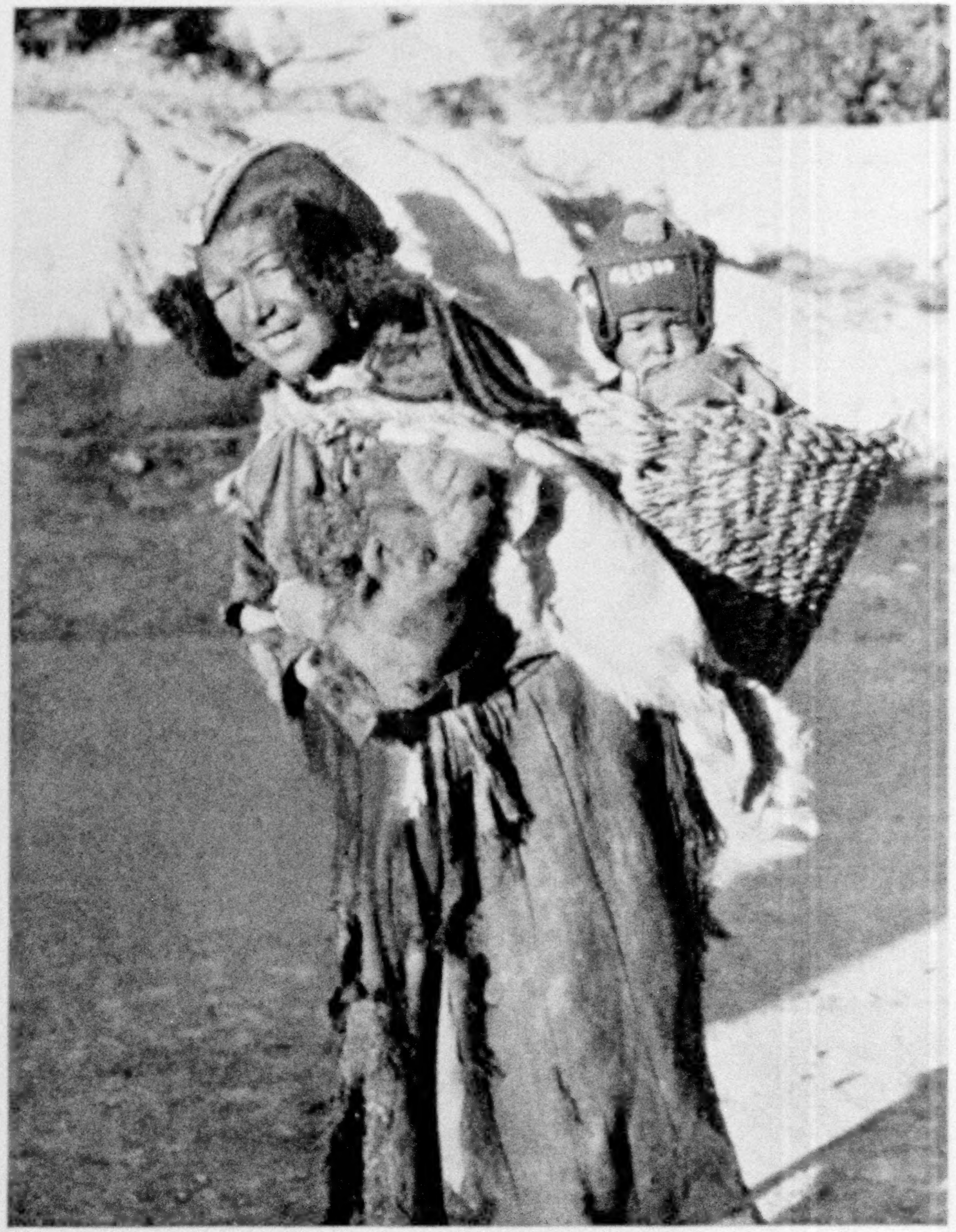
In the heart of a Sinkiang oasis, golden with the harvest of late August, one can hardly imagine the utter desert of gravel and arid clay that lies half a mile away, beyond the last irrigation ditch. Here the author bade farewell to the pleasant land and likable people of Sinkiang.



Photograph by Eleanor Lattimore

THOUGH MUCH MARRIED, A PANAMIK GIRL REMAINS COQUETTISH

Polyandry flourishes in Ladakh. The laughing young woman wears the matron's headdress that proves she has one or more husbands. Her hair, puffed out like a wig, is full of grease and has never been washed. Lumps of turquoise decorate her cap.



THE LADAKH MOTHER CARRIES HER BABY IN A BASKET

Partly because of the scarcity of live stock in a country where grazing is scant, burdens must be borne in many places on the backs of the natives. As packers, the men are little sturdier than their wives. This woman has her hair braided into flat muffs over her ears. It is never combed out.

us. One was a Chinese, who spoke the Turki dialect of the Kazaks; the other was himself a Kazak, and spoke no Chinese. The Kazak was armed with a huge sword, as a mark of his official dignity.

The mountain tribes are not allowed to carry swords, and the possession of such a weapon means that the bearer is on the business of the Government and is entitled to free food and transport from the nomads. A great part of the taxation paid by the nomads is in the form of animals for official transport, and we did not feel that we were imposing on them, especially since we had hired our own pack ponies, and the only ponies commandeered were those taken from day to day by our escorts.

Because of our escorts, we were received by the nomads everywhere as official travelers, and were treated with honor and the most lavish hospitality. At every halting place a sheep was killed for us, and at times we experienced difficulty in avoiding halts in the midst of a day's ride to partake of one feast after another.

Once, when we arrived in the middle of the day at an encampment of a tribal chief, we halted for such a feast. It began with a long wait while a half-grown lamb was killed and boiled. The piece of honor was the head, which had been singed to clean it of hair and did not look appetizing.

When the feast began the ears and slices off the cheeks were first formally offered, and then we proceeded with the more succulent parts, which had been cooked until they were deliciously tender. The meat course was followed by a most palatable broth of the water in which the lamb had been boiled.

A COUNTRY WOMAN COMES INTO MARKET AT KASHGAR

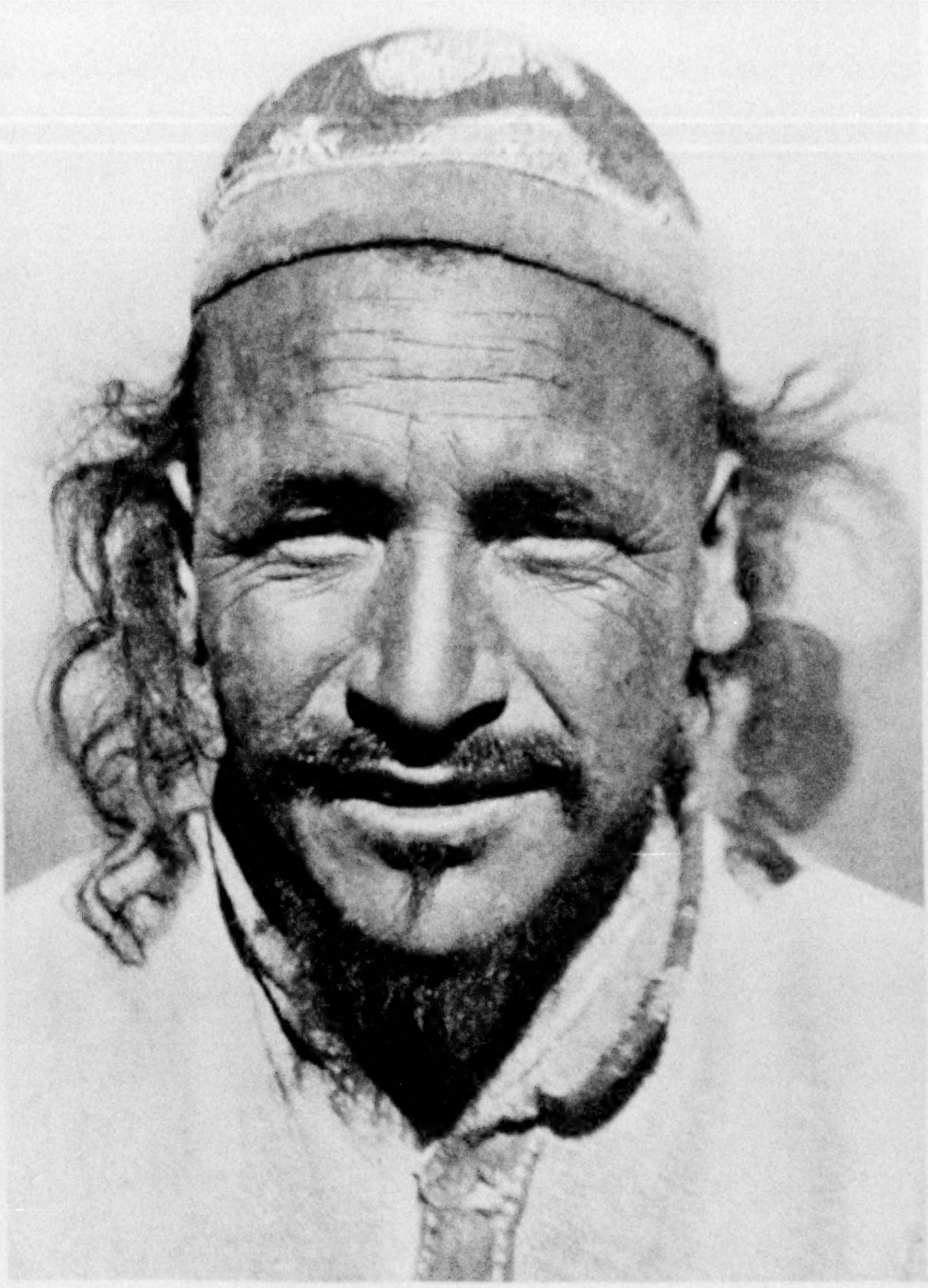
The donkey has snatched a bite to eat as he passed a stall, and his rider is beating him to hustle him by the infidel who is staring at her unveiled face.

MARE'S MILK IS A POPULAR DRINK IN CENTRAL ASIA

Before this meal, and wherever we halted, we were offered quantities of mare's milk—a thin, somewhat acrid drink, which I found delicious, but which Mrs. Lattimore did not relish. This was the famous kumiss of the horse-herding nomads—a drink to be obtained only where it is possible to maintain enormous herds of horses. In Russia, at places near to the Kazak steppes, there are regular sanitaria where people gather to drink kumiss, as a cure for all kinds of digestive troubles.

Mare's milk is always thin and sour, and in the form of kumiss it is lightly fermented. The kumiss is prepared in a whole coltskin, which has been sewed up to make a bag, the neck being the mouth. In this is placed a wooden dasher, and the milk is rapidly and frequently churned. The inside of the skin being sour from previous brews, the milk rapidly ferments. Another drink, arak, which is much more powerful, can be distilled from kumiss.

All summer the nomads remain in their pleasant encampments in the superb high valleys of the Tien Shan. It is the happiest time of year for them—especially for the men The children herd the animals and the women milk the sheep, goats, cows, and mares, but the men lie in their tents all day, drinking kumiss; or, if they are taken with a burst of energy, they may ride off to pay a round of visits at distant encampments, thinking nothing of a journey of five or six days.



AT CARAVAN WORK THE LADAKHIS EXCEL

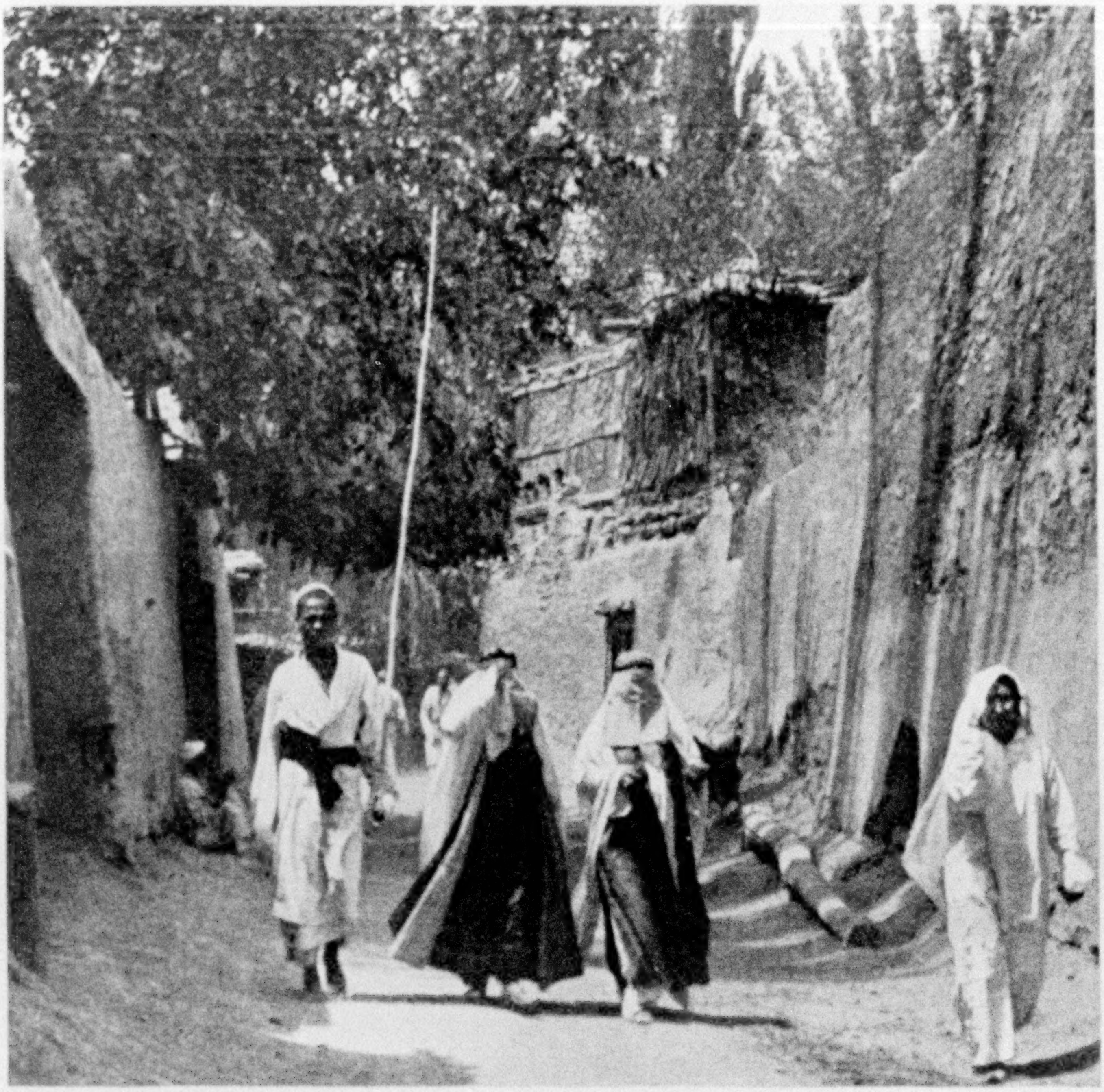
Magnificently hardy, never complaining of bad weather or adversity, and always cheerful and resourceful, these faithful toilers are well-nigh indispensable on long journeys. The subject of the photograph is a native of the Ladakh village of Panamik. Unlike most of his fellows, who are mainly of Tibetan blood and speak the dialects of Little Tibet, their homeland, this man is of a pronounced Aryan type.

THE LIFE OF THE NOMAD IS EASY

The conditions of nomad life are easier here than in almost any other place in the world, but in spite of this the Kazaks have not multiplied enough to feel crowded. One can ride through miles of lovely valleys in the Tien Shan, where the rich grass grows breast high, without seeing flocks or tents.

In summer the nomads move uphill, driving their flocks in search of the tenderest grass, which comes up just after the snow has melted. In winter they return down hill and take shelter on the edges of magnificent spruce forests, which act as windbreaks for the protection of the flocks and supply the people with abundant fuel.

The winter quarters are often villages of log huts, with spacious corrals for stock. In some places, where the valleys are especially rich, the Kazaks do a little crude plowing and gather catch-crops of wheat to lay up for winter supplies. They dis-



Photograph by Eleanor Lattimore

WOMEN WALK VEILED IN KASHGAR LANES

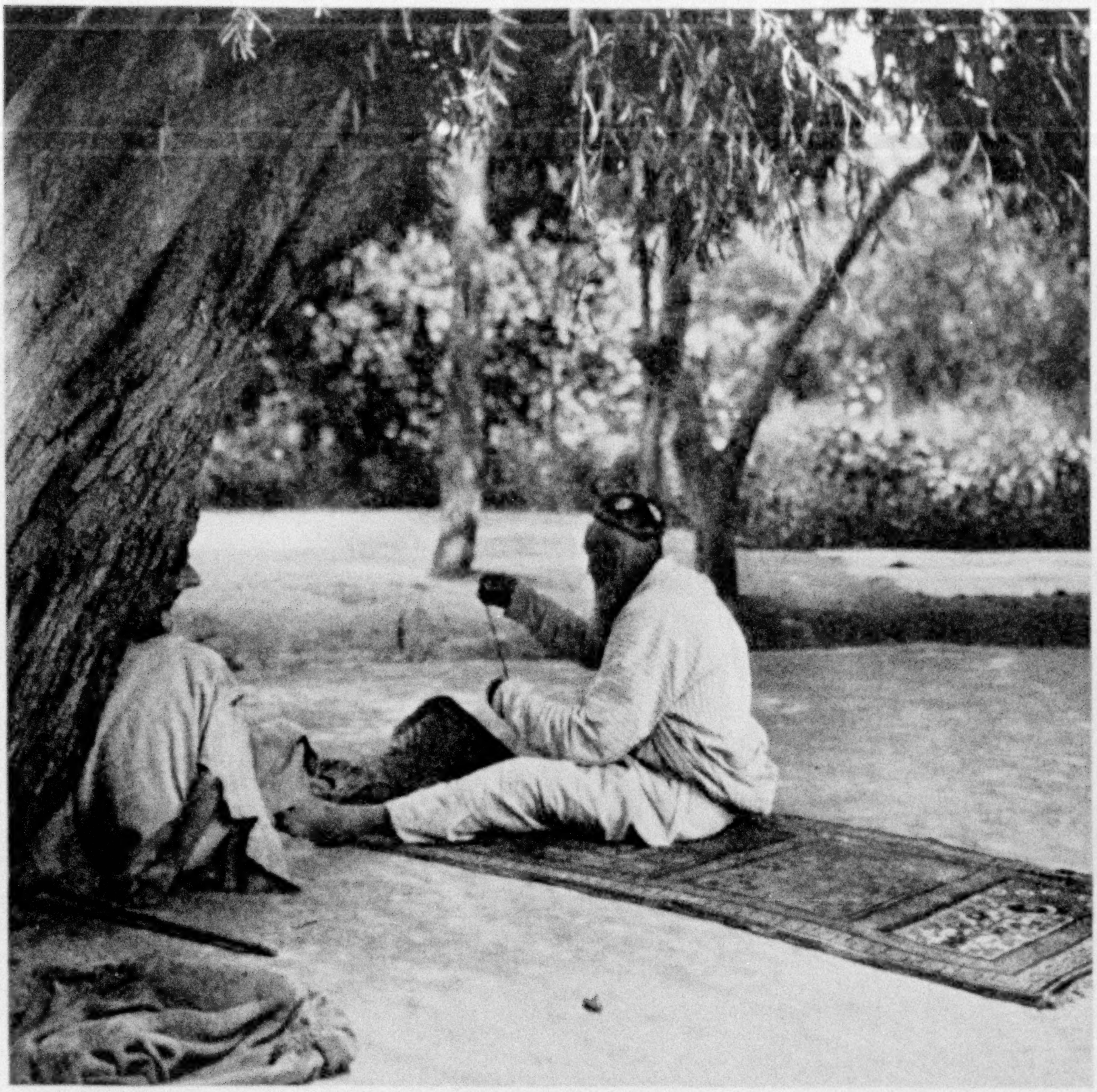
Although Moslems, the easy-going Turkis are lax in many observances, and in some places, especially small villages, the feminine face covering is left off; but in larger towns, such as this city and Yarkand, strict decorum is the rule.

like this labor, however, and only the poorest of them will do it. Most of the grain and flour they need for winter is obtained from Chinese and Turki settlers in the lowlands.

When we started into the Tien Shan I had a vague idea of big-game shooting. Some of the districts, notably the Koksu Valley and the Kargai Tash, are celebrated for wild sheep, bears, snow leopard, wild boars, wapiti (the Asiatic elk), and the Tien Shan ibex, the most magnificent of his kind.

We found, however, that we had come at the worst possible season, when the horns of the wapiti were in velvet and the animals were being eagerly hunted down by the Kazaks. When in the velvet, the horns are full of blood and are in great demand as medicine among the Chinese, who consider them a sovereign tonic. The horns are cut off at the base and sealed, to prevent loss of the blood, and are then boiled in brine and carefully dried. Often elk are kept in captivity and the horns cut off every summer, as they mature; but the horns of animals in captivity never attain quite the prime condition of those of the wild elk.

Not only had the best local hunters, who



A RUG VENDER MAKES REPAIRS TO ORDER

While the author's party was encamped in a garden of Yarkand, bargaining for caravan men to take it over the "Roof of the World," this old fellow solicited the purchase of a rug in which there was a hole. To insure a sale, he agreed to mend the break with fingers skilled in the central Asian weaver's art.

knew the ground, gone off after elk, but they had frightened the game. I soon gave up the idea of "serious" shooting, and we treated ourselves instead to a month of camping and wandering in lovely mountain valleys, camping sometimes near the nomads, at other times in lonely, almost inaccessible places.

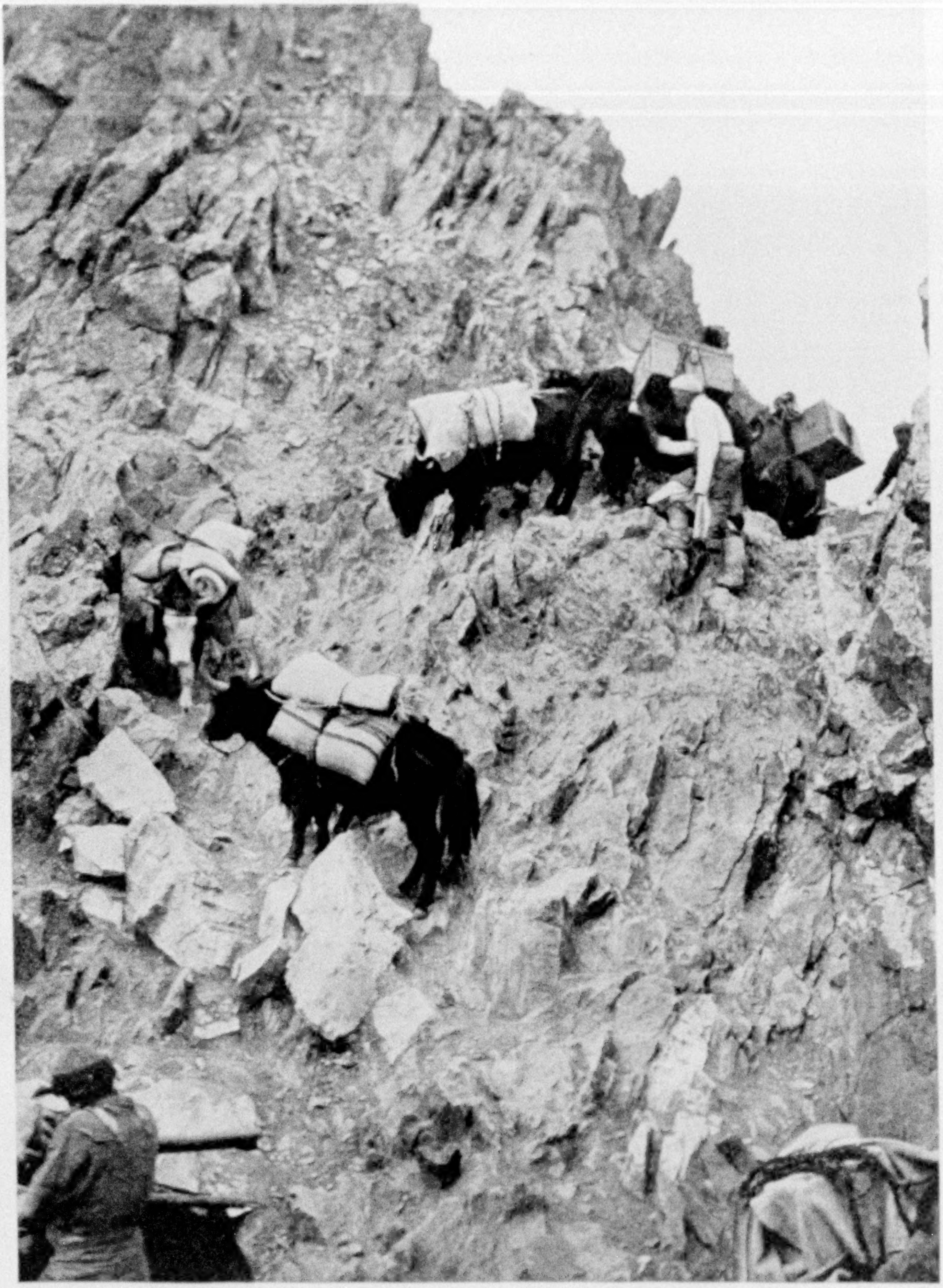
SMALL GAME IS INCREDIBLY PLENTIFUL

The smaller varieties of game were incredibly plentiful and we had plenty for the pot. At one place, just after we had camped, I strolled into the forest with my rifle. Ten steps after I had lost sight of camp, and while I could still hear one of our men chopping wood for fuel, I saw a roe deer. I was far too surprised to be ready, but it waited politely until I shot it.

After a month of this idyllic life, we crossed over to the southern slopes of the Tien Shan by the Muzart, or Ice Pass. The head of the valley, at an elevation of more than 11,000 feet, is filled with a huge glacier, by the edge of which we camped.

Many of the peaks about us were of white marble, while others were sheeted with ice.

We climbed on to the glacier and stumbled along it for miles, our way hidden by



ON HARD CLIMBS THE YAK HAS NO EQUAL

Sure-footed, patient, and strong, these pack animals are carrying the author's belongings over the knifelike ridge of rock at the crest of the Sanju—altitude, 16,650 feet. The ponies were taken across lightly laden. Although not the highest, this is one of the most difficult trails of the Way of the Five Passes, between Yarkand and Leh (see text, page 702). Heart and lungs labor painfully in the rarefied atmosphere at the almost perpendicular final ascent.

clinging mists, through which loomed occasionally cliffs of white marble or red porphyry. The glacier was much cut up with crevasses and chasms filled with beautiful blue water. The changing of the fissures in the ice, causing the trail to be changed from year to year, made the way difficult, and we had to make sure, as we went along, that we were following the line of the freshest courses.

The pass is the only direct line of communication between Aksu, on the Great South Road, and Kuldzha, on the northern side of the mountains, and thus, in spite of its difficulty, is of considerable importance to trade.

The contrast of climatic conditions after crossing over the mountains was so abrupt as to be startling. Almost all of the rainfall of the Celestial Mountains is concentrated on the northern slopes. On the southern side they seemed no longer the Celestial Mountains. The dark forests and bright meadows gave way to barren slopes of rock and starved valleys in which grew only a little coarse brush.

On account of the lack of rainfall, the air was bright, dry, and dazzling under a cloudless sky, and as we descended the heat radiated against us from the bare rocks. Until we had cleared the foot of the range and reached the oasis-level, we saw hardly any sign of human life except a few toiling caravans.

THE TURKIS ARE A FRIENDLY PEOPLE

From Aksu onward, although we passed through the limited region inhabited by the Dulanis, we were almost entirely among the oasis-dwelling Turki people, the true Turkis of the division of Chinese Turkestan often called Kashgaria. A friendly, docile, very human people we found them, fond of laughter, talk, music, fairs, and crowded markets. They were patient and strong as workers, though not so devotedly industrious as the Chinese.

We traveled from Aksu to Kashgar in July, during the most crushing heat of the dry lowland summer. At this season the oasis people take life easy. In spite of the heat, the drought, and the deserts that surround them, they live at ease in security; for the hotter the weather, the more water they have. Rain is almost unknown to them, but the glaciers melting in the mountains send streams rushing down the valleys, to be diverted into their irrigation channels and spread out over the thirsty fields.

All day the oases, shaded under tall poplars, sleep without a sign of life in an atmosphere that throbs with heat. Then, at evening, people begin to come out of their doors. Venders of vegetables, fruit, and melons set up their stalls in the streets and shopkeepers take down the hot, dusty shutters of their booths. Carters look to their ponies and get their lumbering carts in order, and men in loose white garments, girt with sashes—their summer costume, contrasting with the bright colors of their winter wear—and women in white robes that look very much like nightgowns, appear to take up the day's business as the day ends. After dark one sees groups gathered about glowing cooking fires, and chatter and laughter continue far into the night.

WE TRAVEL IN A STRANGE EQUIPAGE

Because of the oppressive heat we, too, lived more by night than by day. At Aksu we hired a great cart mounted on two high wheels that, though not exactly round, were round enough to roll. It was drawn by four ponies.

In the bottom of the cart we laid our heavy boxes and equipment. On top of these we put an imposing structure—a little house, lent to us by a Chinese official. It had a window at the back and double doors in front, both screened to keep out mosquitoes. On the floor of the house we spread our bedding; and then forth we went on our giant wheels, bound from Aksu to Kashgar.

Our beds were deeply cushioned with felts, so that, as we jolted ponderously along, we did not feel the bumps too much. Armed escorts provided by Chinese officials followed us, leading our riding ponies. Starting about sunset, we would continue until the small hours of the morning. Most of the time we could sleep; but occasionally, when the moonlight flooded bare desert or scattered tangled shadows among obscure jungle thickets of wild poplar and tamarisk, we would get out in our pajamas and ride for a while, our escorts chanting interminable sonorous ballads.

We seemed to live entirely in pajamas. At the end of the stage we would either sleep in the cart until daybreak, with its threat of suffocating heat, or tumble at once into an inn room.

The inns were mud hovels, each a series of rooms grouped caravansary fashion around a square. The rooms were low and windowless, the better to keep out light; for light, in a Turkestan summer, means heat. Most of the space of our quarters would be filled with the raised sleeping platform, on which we put our bedding, and above this hung a tented mosquito net.

There, in a half-light which, if not cool, was not so overpowering as the glare in the court, we would spend the day, reading, sleeping, eating, and sometimes working. I would squat cross-legged, naked to the waist and streaming wet, near a shaft of light from the badly fitting door, hammering out on the typewriter the record of our doings.

We lived very simply, mostly on eggs and fruit. These were plentiful, but in a few places the water was bitter. At these stages we were provided with water sent ahead especially for our use, carried in huge hollow gourds loaded on a donkey.

The apricots and nectarines were luscious and so good that one day we each ate more than a hundred. Melons, however, were our staple. Watermelons we would hardly condescend to eat, but on innumerable and delicious varieties of muskmelon and cantaloupe we feasted daily.

One reason for the great abundance of melons was that they grow on soil too salty for other crops. Often, when a new tract of land has been irrigated, nothing but melons are grown for several years; for, though deliciously sweet and fragrant themselves, they extract salt from the soil, making it suitable eventually for other crops (see page 681).

TURKI WOMEN ARE NOTED BEAUTIES

The women of Turkestan, as well as the fruits of the province, are extolled in a Chinese proverb:

> The grapes of Turfan, the melons of Hami;
> The girls of Kucha are all like flowers.

Because of the easy, sheltered life they lead in the oases, with almost no danger of attack by strangers and a plentiful supply of food guaranteed to them by the annual melting of unseen snows, the Turki people feel little pressure of economic hardship. This freedom from want and care, almost unique in Asia, allows the women an unusual degree of emancipation.

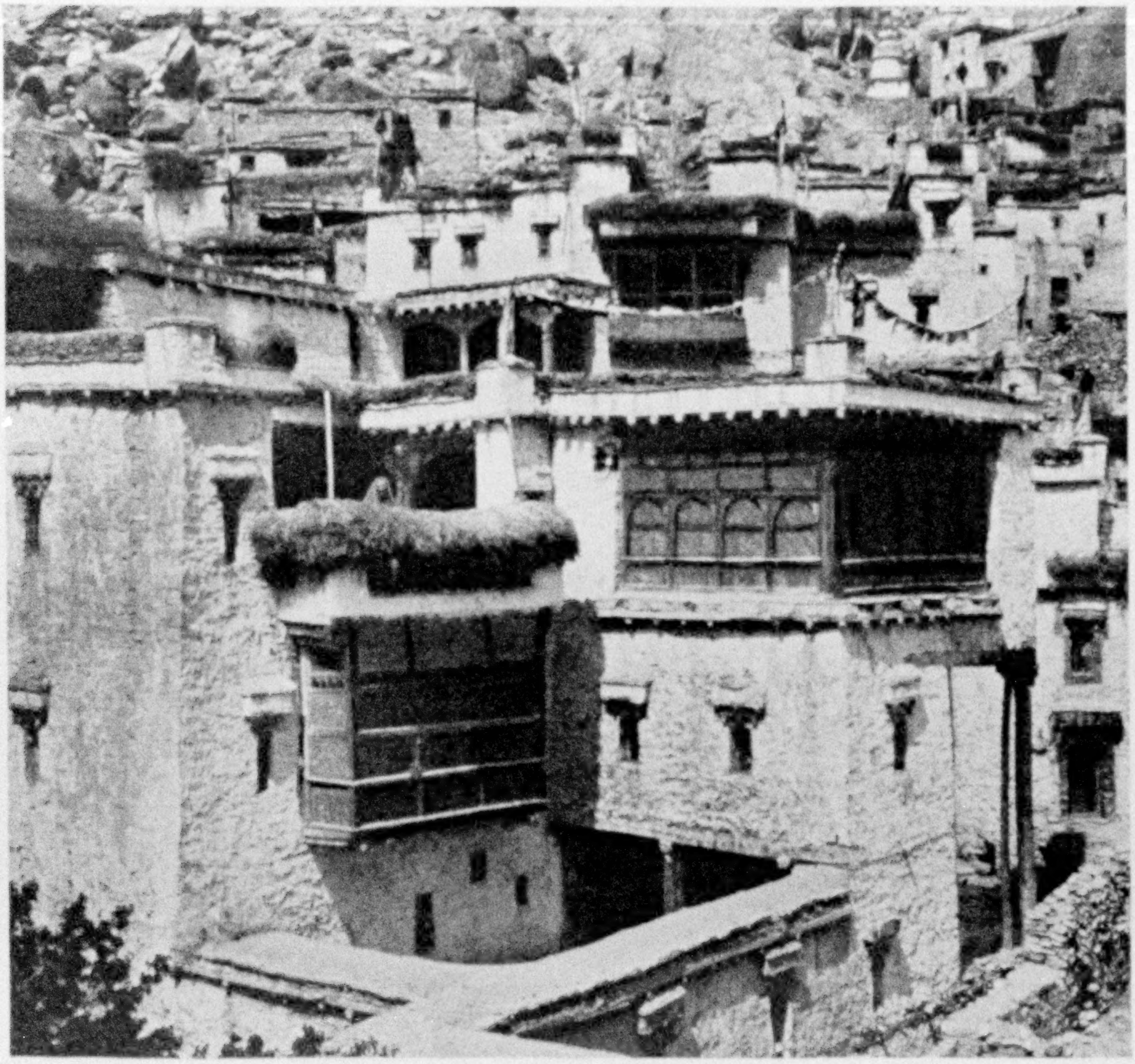
It is true that among the Turkis, as among all Mohammedan peoples, a woman is regarded as an inferior example of God's most divine creation, Man; but she is much less of a chattel and much more of a free agent than she would be if life were harder and her value greater as an unpaid servant in the house.

A PHILANDERING DRIVER TAKES US OVER A ROUGH ROAD

By Mohammedan usage, a man may have as many as four wives at a time, and divorce them merely by repudiating them. In Turkestan, however, a woman has practically the same facility of divorce as her lord. The result is that an upright and respectable citizen, without running any risk of being considered flighty or wayward, may have as many as 40 legitimate wives in the course of his easy-going, tolerant life, while a perfectly virtuous woman may have nearly as many husbands.

It seems to be a rule of human nature, more important than any religion or any code of laws, that pretty women, whatever the time or clime in which their lot be cast, can count on getting the best of whatever is to be had. The great advantage possessed by the pretty Turki girl is that it is easier for her to get the best. Pretty women make a regular profession of marriage, accumulating riches in the form of endowments from successive husbands.

The owner of our cart, a wizened, crablike old fellow, had also a smaller cart, and in this he was conveying a pert, attractive little wench, who had had enough of her current husband and was going home to her mother, accompanied by a lively little brown brat. At first the carter put his young son in charge of the smaller cart; but the conveyance was forever being mysteriously delayed on the road. Then the old man gave his son a very guttural piece of his mind, and drove the smaller cart himself, putting the youth in charge of our lumbering ark.



THE MONASTERIES OF LADAKH ARE BUILT UP, TIER ABOVE TIER, AGAINST THE STEEP HILLSIDES

Here, huddling about tiny courts and jostling in ranks one above the other, are the snug buildings of a typical congregation of lamas. The roofs are covered with fluttering yak tails on spears. The lamas of such a congregation as this are not only prosperous landlords, receiving rent from the surrounding villagers, but often they are also money-lenders to the farmers.

This, however, only led to further trials. The youth, by now hopelessly enamored, spent all his hours at the inns, where he should have slept, in endeavoring to capture the fancy of the flirtatious girl, with the result that while perched on the shafts of our cart during the night marches he constantly fell asleep and let the ponies either come gratefully to a halt or wander off the road. On one occasion, not liking the looks of a bridge, our team cheerfully descended into a ditch, nearly wrecking the cart and standing us on our heads.

After more than two weeks of this primitive kind of travel, casual and delightful and gypsylike in spite of the heat, we entered Kashgar in the chill of a gray dawn (see illustrations, pages 692-696).

Leaving the cart in one of the long poplar avenues that approach the city, we mounted our ponies and, with our escorts, trotted briskly through the almost empty streets in search of the British Consulate General.

OUR GUIDE IS A TRUE COSMOPOLITE

Major Gillan, the Consul General, and his wife were away in the hills for a brief trip, but they had left hospitable orders for our entertainment, and until their return we took our ease in surroundings of the highest oriental luxury, among terraced gardens, where rills of brown water ran by beds of bright flowers and the roots of heavy-laden fruit trees.

Pending the return of Major and Mrs. Gillan, we were delightfully entertained by Mr. Chu, the Chinese Secretary to the Consulate General, who took me to pay preliminary calls on Chinese officials and rode with us to mosques and shrines and the show places of the city.

Mr. Chu was a shining example of the adventurous young Chinese. During the World War he had gone to France as an interpreter-officer with the Chinese Labor Corps, and afterward had come to Kashgar, over the Karakoram route, in the British service.

Not only was Mr. Chu justly proud of his English and French, but since coming among the Turkis he had thrown himself wholeheartedly into the study of their religion and their ways. He now spoke fluent Turki, had embraced Islam, and exhibited with pride an elaborate edition of the Koran, printed in India in English and Arabic. As a final cosmopolitan touch, he spent most of the day during the hot weather in a Japanese kimono. We could not have had a more entertaining and sympathetic guide.

With the return of our official hosts we seemed to pick up all at once threads of our own world and the lives of our own people, which for months we had left out of sight and out of mind, in the ever-changing and always fascinating life of the road in far places.

Kashgar had a double strangeness to us. The usual traveler enters these regions over the high mountain barriers that divide them from India, and to him Kashgar is the outpost of the unknown.* To us it was the outpost of the known, the first place where we came in contact with familiar influences, and we looked upon the Swedish mission as a populous colony.

The sense of a return from the true East to the westernized East increased as we traveled on from Kashgar to Yarkand, where we made our final arrangements for the last stages of the journey to India. Several times on the road we met travelers: a new vice-consul on his way to Kashgar, and British officers on leave from India, who had either been hunting *Ovis poli*, the great sheep of Marco Polo, on the Pamir, or were "just traveling," in the indomitable way of the British officer on leave.

WE PASS OVER "THE ROOF OF THE WORLD"

The hospitality extended at Kashgar did not end when we took our leave, for word had been sent to the headman of the Indian traders at Yarkand to help us in preparing our transport for the journey to Leh and Srinagar.

At Yarkand we hired a train of pack ponies, in charge of four cheery Ladakhis—Tibetans of Ladakh, or Little Tibet. With them we traveled for nearly a month over the stupendous route of the Five Passes, the highest trade route in the world, to Leh, the capital of Ladakh. The highest of the Five Passes, though not in fact the most difficult, is the Karakoram, which rises to 18,300 feet above sea level.

This journey over the ridge of the world was a magnificent experience in itself, and was in some ways the most splendidly arduous and enjoyable part of all our trip. In achieving it, my wife completed a unique adventure: She was the first woman, so far as available records show, to travel from Peking overland through Chinese Turkestan to India.

Our journey came to its real end on the day when, after yet another fortnight of travel from Leh, we reached the crest of the Zoji La. Then, in one stroke, we left behind us the barren, wind-haunted highlands of Tibet, and saw below us, opening downward, the wide, easy valleys of Kashmir and the slopes of tall mountains clothed with evergreens, among which birches were turning to the coppery colors of autumn and shedding their leaves.

Srinagar, by the famous lakes of Kashmir, was only a few easy marches below us; and from Srinagar we could travel by motor, over well-made highways, the last 130 miles to the railway.

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* See "By Coolie and Caravan Across Central Asia," by William J. Morden, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1927.

CALIFORNIA, OUR LADY OF FLOWERS

BY CHAPIN HALL

CALIFORNIA is one great bouquet. From its stem, formed by Point Loma, the nosegay bulges like an overfilled market basket, as it draws beauty from the terrain between Los Angeles and San Francisco, but tapers to a graceful top at the Oregon border. In March and April the State is fairly bursting with the joy of life—the loveliness of spring in a perfect setting. She is almost smothered beneath an avalanche of buds and blossoms. Mountain springs are singing and everywhere Nature is proclaiming a story of new birth, new beauty, new opportunity. It is the story of the Golden State, spread across her bonny face in the language of flowers.

In the springtime the desert is athrill with color and life. Fruit orchards have donned their kaleidoscopic garbs and splotch the map with the delicate tracery of their charm. Mountain sides blaze with the famous California-poppy; in the higher reaches snow plants (see Color Plate XI) and rich ground tints produce vivid effects to combat drab winter's final stand.

The great redwoods (see Color Plate XXIV) have added another birthday ring to their cycle of serene overlordship, which, for some of them, goes back far beyond the beginning of the Christian calendar. Along the golden shores flora and verdure, varicolored, run to kiss the surf as it breaks blue, or green, or white along a thousand miles of coastline.

IN THE DAYS OF SPANISH DONS

For a long time California dreamed in her semitropic setting, gaining strength and favor. There was plenty of time to be happy, plenty of time for Destiny to weave her intricate pattern across the mountains and desert and up and down her lovely coastline. The country was loosely articulated by a chain of great estates owned for the most part by Spanish dons, who rode magnificent horses over freshly made trails, held fiestas, gave and were given in marriage, maintained indifferent access with the outside world via infrequent trading vessels, and lived a life apart, yet full and sufficient—a life which has left its imprint even to this day.

Superlatives come easily in any discussion of this State. Each year throngs of tourists enter her latchless borders. They travel mile upon mile of surfaced roads, they climb her mountains, they visit her matchless desert spaces, and they look out from her front yard to where the setting sun spills a million paint pots over the horizon. They revel in her climate, marvel at her cities, wander in her groves and orchards, inhale the delicate odor of her blossoms, and gaze in awe at her natural wonders.

Many of these tourists stay, and so year by year the State recruits favored sons and daughters from all the land; and this diversity of stock and its quick amalgamation give to California a citizenry of new blood which affords an interesting study in the building of a race.

THE MOUNTAINS BURST INTO BLOOM

In the early spring California dons her party dress and looks her best. The winter rains have tinted hillside and pasture land a verdant green. In the citrus areas the delicate orange blossom fills the air with its perfume, and miles of trees stretch like milky ways as far as the eye may follow, foretelling the rich returns of the coming season, when these blossoms will have been converted into fruit.

In other sections cherry blossoms stage an exhibition which jams the roads with sight-seers. The almond trees are indescribably lovely. The landscape is filled with color, while snowcapped peaks are seen through the tree tops.

This is cultivated loveliness; but one day, after a searching rain followed by warm sunshine, a mountain side suddenly bursts into flame—a veritable spontaneous combustion. This miracle is followed by another and another, until the Lady of Flowers is in ecstasy. One vista after another opens to the traveler, each one more beautiful than the preceding. Literally, all outdoors becomes one vast garden of flowers, until it seems there is no end to the colorful panorama.

John Bidwell, an early American pioneer, writes in his reminiscences:

"Never did I expect to see the earth so

beautifully arrayed in flowers as it is here. On seashore and mesa, in deep, cool canyon, on dry and open hill slope, on mountain, in glacier meadow, by stream and lake, in marsh and woodland, they paint the face of Nature in a thousand colors."

The "cup of gold," as the Spaniards called it, is the queen of wild flowers, the California-poppy (see Color Plate XI), of which Joaquin Miller sings:

> The golden poppy is God's gold,
>   The gold that lifts, nor weighs us down,
> The gold that knows no miser's hold,
>   The gold that banks not in the town,
> But singing, laughing, freely spills
> Its hoard far up the happy hills;
> Far up, far down, at every turn.—
> What beggar has not gold to burn!

THE DESERT IS A MAGIC CARPET IN SPRING

And the desert! Who can look upon the desert in the spring and talk of a barren waste? Even Death Valley, for ages California's bogy spot, a place to be spoken of in awed whisper, a death trap, now has its tourist hotels and tent camps, to which transcontinental travelers detour and which residents of Los Angeles and coast cities eagerly visit over week-ends during eight months of the year.

The desert has an indefinable pull, and it is the combination of desert, mountain, and sea, each with its overflowing blessing of flowers, which makes California the splendid playground it is (see Color Plates VI and XV).

Desert vegetation exhibits its greatest growth and beauty between February and May. It includes the yucca and juniper, the creosote and mesquite, many varieties of shrub and herbage, an occasional Joshua tree (see Color Plate VI), mixed with Indian paintbrush (a member of the yucca family), monkey-flowers, lupine, prickly phlox, wild buckwheat, blazing-star, sunflower, barrel cactus bloom, ocotillo, and many others, giving for a season the impression of a flower-carpeted world.* In this lush period the desert literally blossoms as the rose, although the rose does not ordinarily blossom in the desert.

The term "wild flowers" poorly describes some of this desert flora. Occasionally they are savage flowers, capable of protecting themselves better than any man-made laws could possibly protect them. In magnificent color, in delicacy of texture of petal, the cactus flowers are perhaps the most wonderful of the California desert blossoms. But no one ever came home from the desert with a handful of cholla flowers or a bouquet of prickly pears. "Look and leave 'em" is the safest motto, for the cactus has a fiendish defense against all comers and it is the part of wisdom to let it waste its fragrance on the desert air.

When one speaks of the climate of California one usually means that which prevails in the strip lying between the Coast Range of mountains and the sea. This is a region of eternal spring, where "so gently slide the seasons from summer to autumn, and from winter to spring, that summer seems but winter smiling, and winter but the summer born anew." Of it Tennyson might truly have written:

> In the afternoon they came unto a land
> In which it seemed always afternoon. . . .
> A land where all things always seem'd the same!

California, filled with natural wonders, mothers no scenic symphony more marvelous than the Yosemite National Park (see Color Plates I, II, and X, left), with its mighty peaks, rugged canyons, giant trees, waterfalls tumultuously spreading a protecting veil over the rocky outlines of naked clefts rising from the floor of the valley sheer a thousand feet or more. Trails lead into mysterious depths and up steep mountain sides, to be lost just at the end of a rainbow formed where myriad sunbeams shine upon the translucent falls cascading from a smaller valley far above. Bridal Veil has a drop of 620 feet. The floor of the Yosemite proper is about eight miles long and a mile wide, hemmed in by lofty precipices.

A REMARKABLE GROUP OF CONIFERS

In the giant Sequoia, the sugar pine, the western yellow pine, the red and white firs, and the incense-cedar, we have in this Yosemite region one of the most remarkable groups of conifers in the world. It serves to give the park an interest and charm which gratifies the esthetic sense and stirs deeply the imagination.

According to a legend of the Miwok Indians, the Yosemite Falls are inhabited by spirits, which cause gusts of wind to

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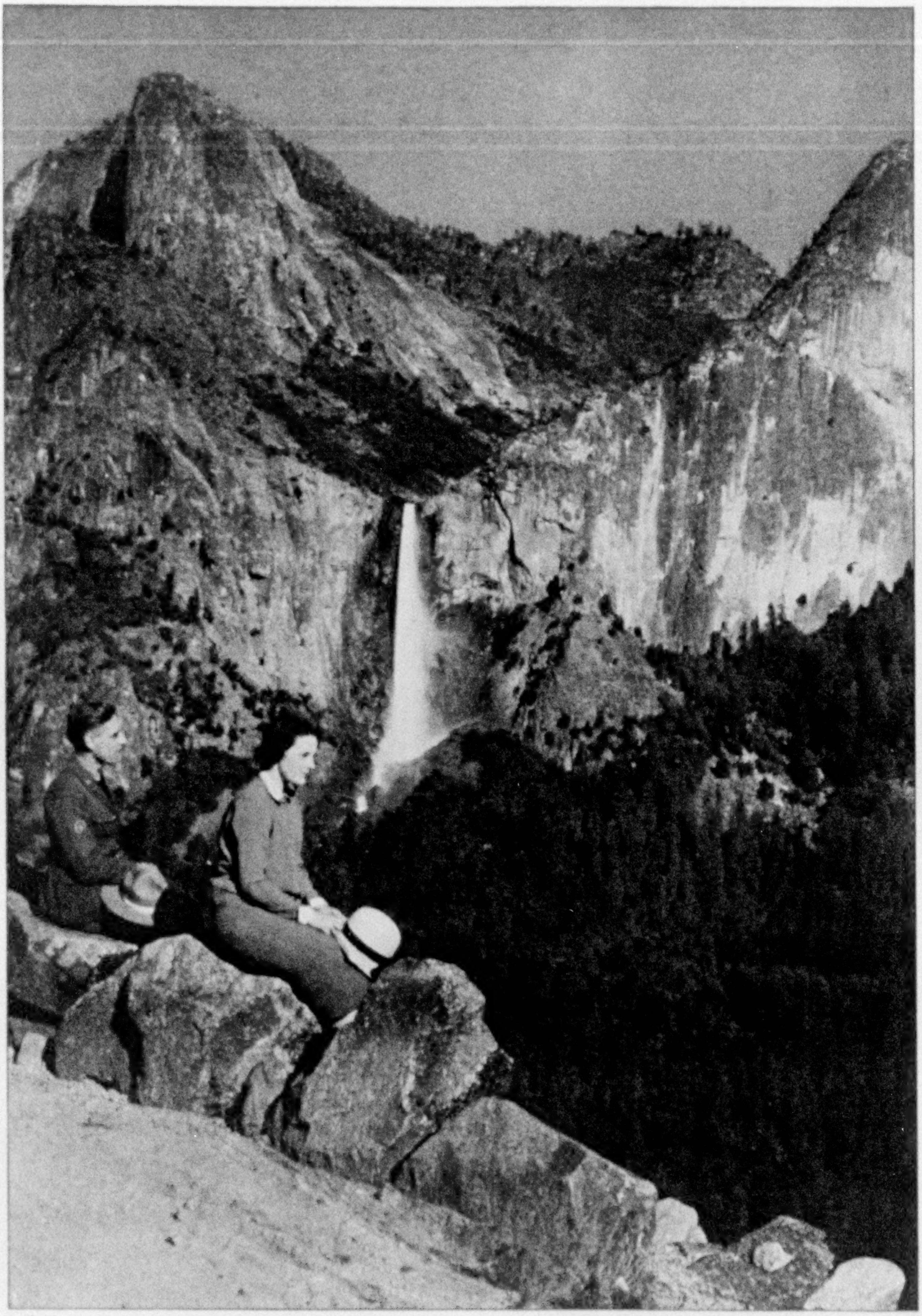
*See "Wild Flowers of the West," by Edith S. Clements, with 206 illustrations in full color, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1927.



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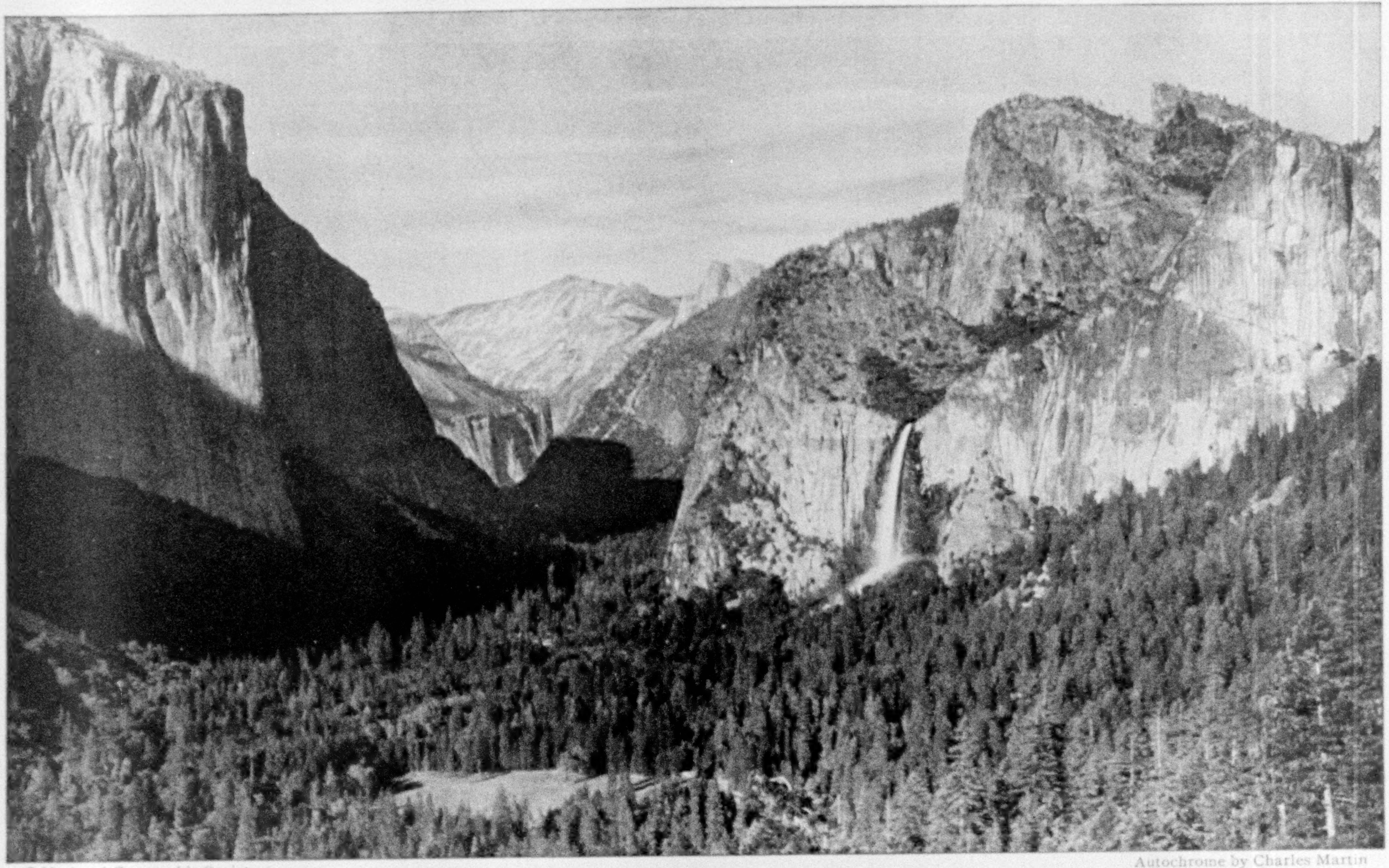
YOSEMITE WORKS ITS SUPREME MAGIC AT BRIDAL VEIL FALLS

Here Nature weaves of light and shade, colorful rock, green forest, and glinting water a tapestry of transcendent grace that holds the visitor spellbound.



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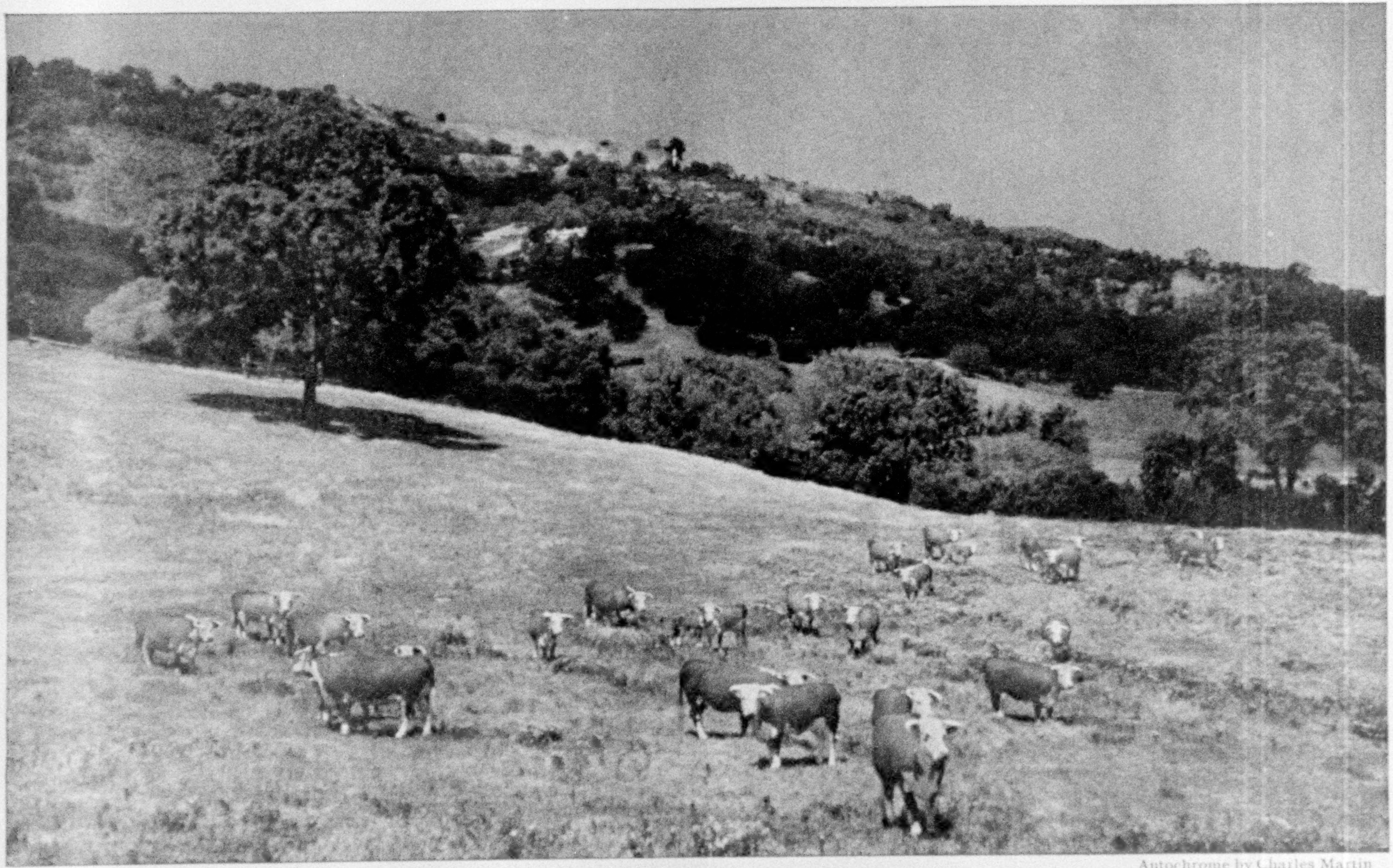
FROM ARTIST'S POINT, YOSEMITE, IS SEEN THE DIVINE PAINTER'S MASTERPIECE

El Capitan, at the left, towers high and casts deep shadows into the verdant valley. On the right Bridal Veil Falls gleam with rainbow tints in the sunlight.



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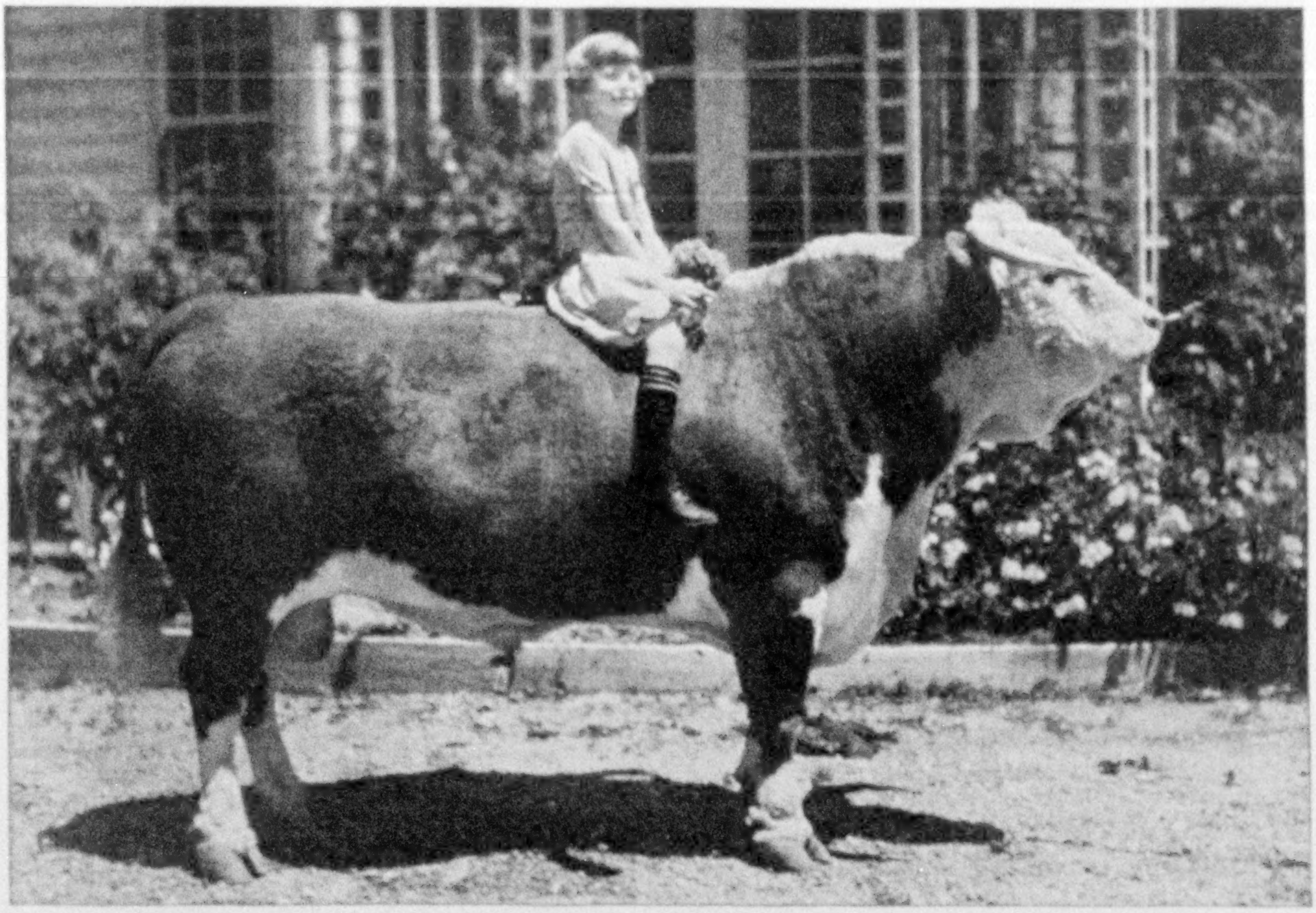
EVER SURPRISING, THE CALIFORNIA PANORAMA TURNS PASTORAL NEAR PLEASANTON

From desert waste or craggy mountain, to the rich verdure of rolling farm land is but a step in this country of amazing changes. Herefords browse contented here in lush grass under skies of perfect blue.



HIS MAJESTY THE HEREFORD ENTERTAINS A LITTLE PLEASANTON PLAYMATE

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THE WIND ACROSS THE WASTES IS NO MEAN ARTIST

Great, barren dunes of sand near Crescent City stretch away in seemingly endless curves, a rippled sea of pastel tints.

ROSES AND GERANIUMS MAKE PRETTY CANOPIES OVER SANTA CRUZ WALKS

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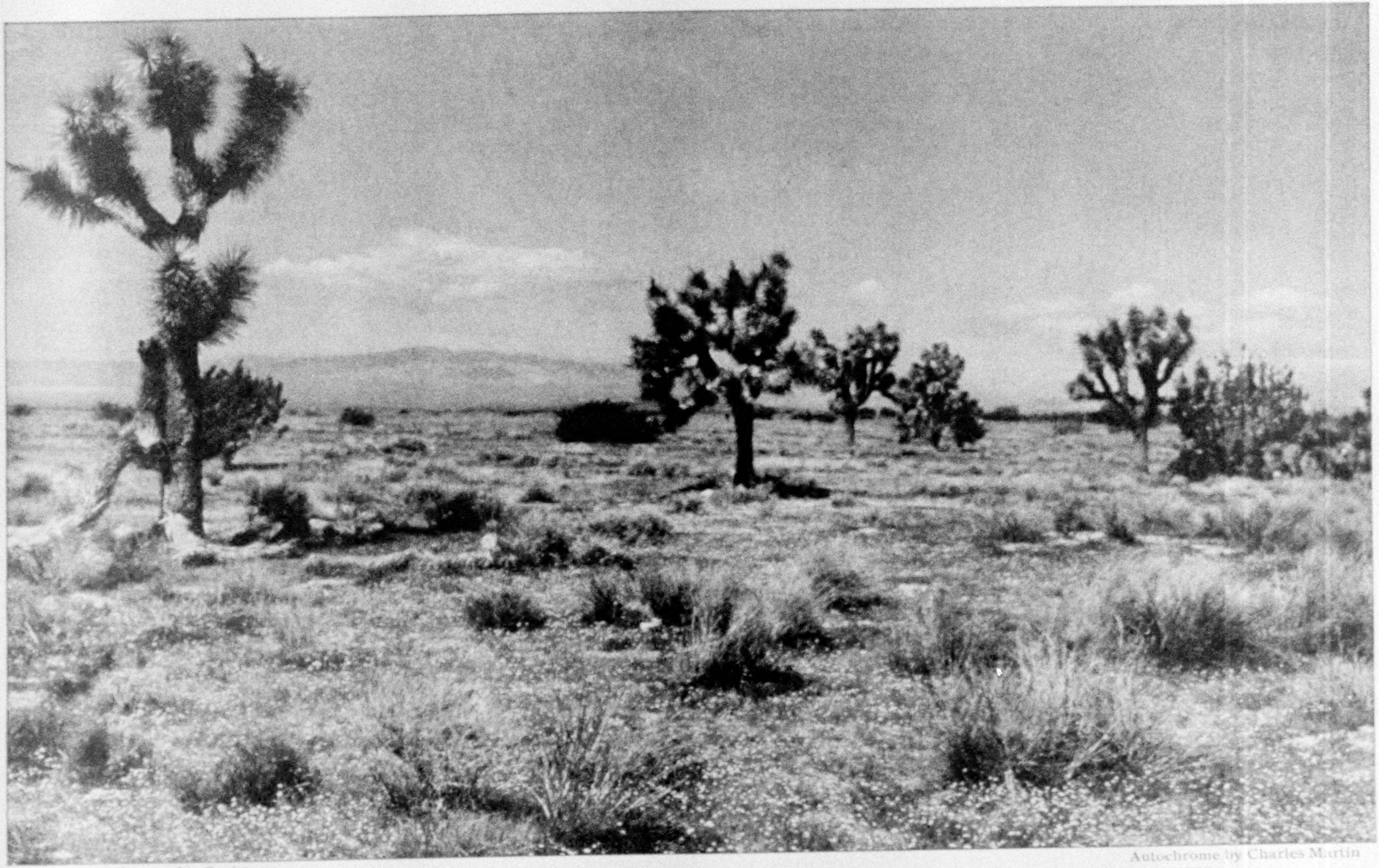
ROMANCE LINGERS STILL IN RAMONA'S GARDEN AT SAN DIEGO

California, home of many famous authors, abounds in places reminiscent of scenes from classics of American literature.



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STANDING IN A CARPET OF GOLDFIELDS IN ANTELOPE VALLEY, JOSHUA TREES RAISE THEIR ARMS TO HEAVEN

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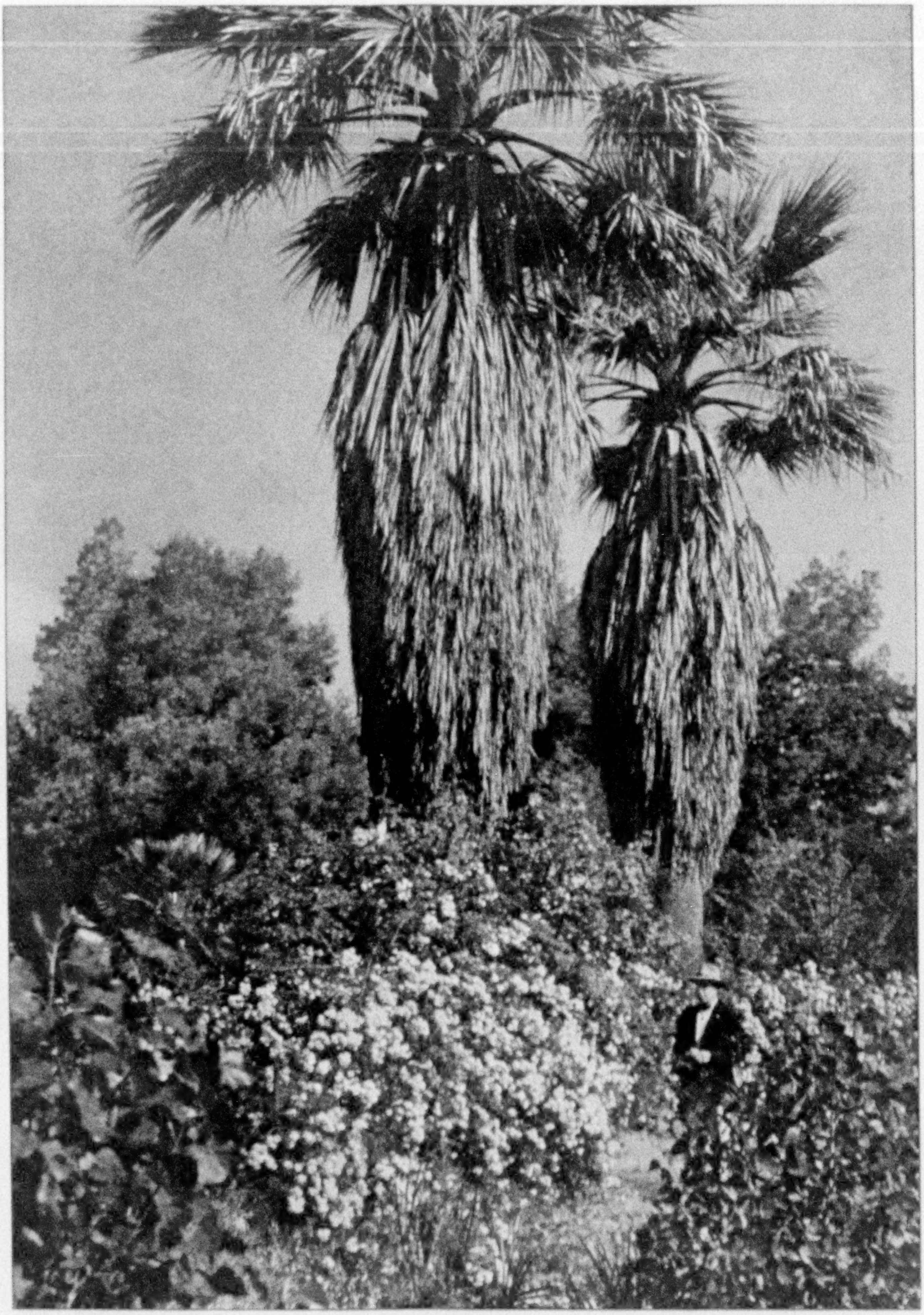
A CLIMATE PRODIGAL OF FLOWERS MAKES POSSIBLE SUCH EXQUISITE GARDENS AS THIS FOR SAN FRANCISCO HOMES



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WILD ROSES GROW AMID PALM TREES AT SAN JUAN

Roadside scenery in the Land of Sunshine presents a bewildering variety, a mingling of vegetation from many climes.

whirl into the water any who may venture too close. Once the spirit captured a girl who had gone for a basket of water. When she dipped it up, the water was full of snakes. These the spirit had caused to enter the vessel, so that she might abandon her accustomed spot and move farther upstream. Each time she dipped her basket, the girl found more reptiles in it, and so gradually she went higher and higher, until she reached the pool at the foot of the falls, into which a violent gust blew her.

From Artist's Point there is a fine view of the valley (see Color Plate II) and its contrasts in height and depth, in verdure and flora. Near the foot of Yosemite Falls, the largest and most spectacular in the valley, the blueblossom, commonly called "blue lilac," grows in profusion (see Color Plate X), the soft coloring blending with the rainbow effects of the torrent, broken in its descent to the floor of the valley.

UNUSUAL RANGE OF NATURAL CONDITIONS

The Yosemite National Park, which embraces 1,100 square miles of "valley incomparable" and scenic mountains, offers a rich field for the botanist. So great is the range of natural conditions between foothills and mountain glaciers that one authority estimates that 1,200 species and varieties of flowers, plants, and ferns are native to this area. Though most of these are typical of the entire Sierra Nevada, many are exceedingly rare.

Foremost among the shrubs which lend interest and charm to the mountain side is the deerbrush, with its tall, slender stems, scattered foliage, thin leaves, and abundant masses of delicate white blossoms. The foliage of this brush is eaten by the deer, which abound within the park.

The sweet birch inhabits open spots in the forest. The fragrance of the western azalea is enhanced by abundant bloom. The delicate canchalagua, with its snowy clusters of bright, thick flowers; the taller collomia, with its dense heads of dainty, funnel-formed blossoms, almost salmon in color; the golden mimulus, or monkeyflower; countless blue flowers, such as the light-blue pentstemon, with its whorls in tall stems; tall blue forget-me-nots; tiny, dark-blue collinsia; the red Indian paintbrush; the brilliant scarlet pentstemon, with lance-shaped leaves and funnel-formed corolla, about one inch long; golden buttercups—all go to form the brilliant mosaic of large sheets and pools of color on the valley levels.

The wide variety of conditions, ranging from the hot and desiccated slopes of the brush-clad foothills to the bleak summits above timberline, the abode of glaciers and perpetual snow, gives to the flora an exceedingly diverse and interesting character. Innumerable springs, creeks, rivers, ponds, and lakes provide suitable habitats for moisture-loving plants. Rocky outcroppings, enormous cliffs, and gravelly ridges accommodate species adapted to such situations.

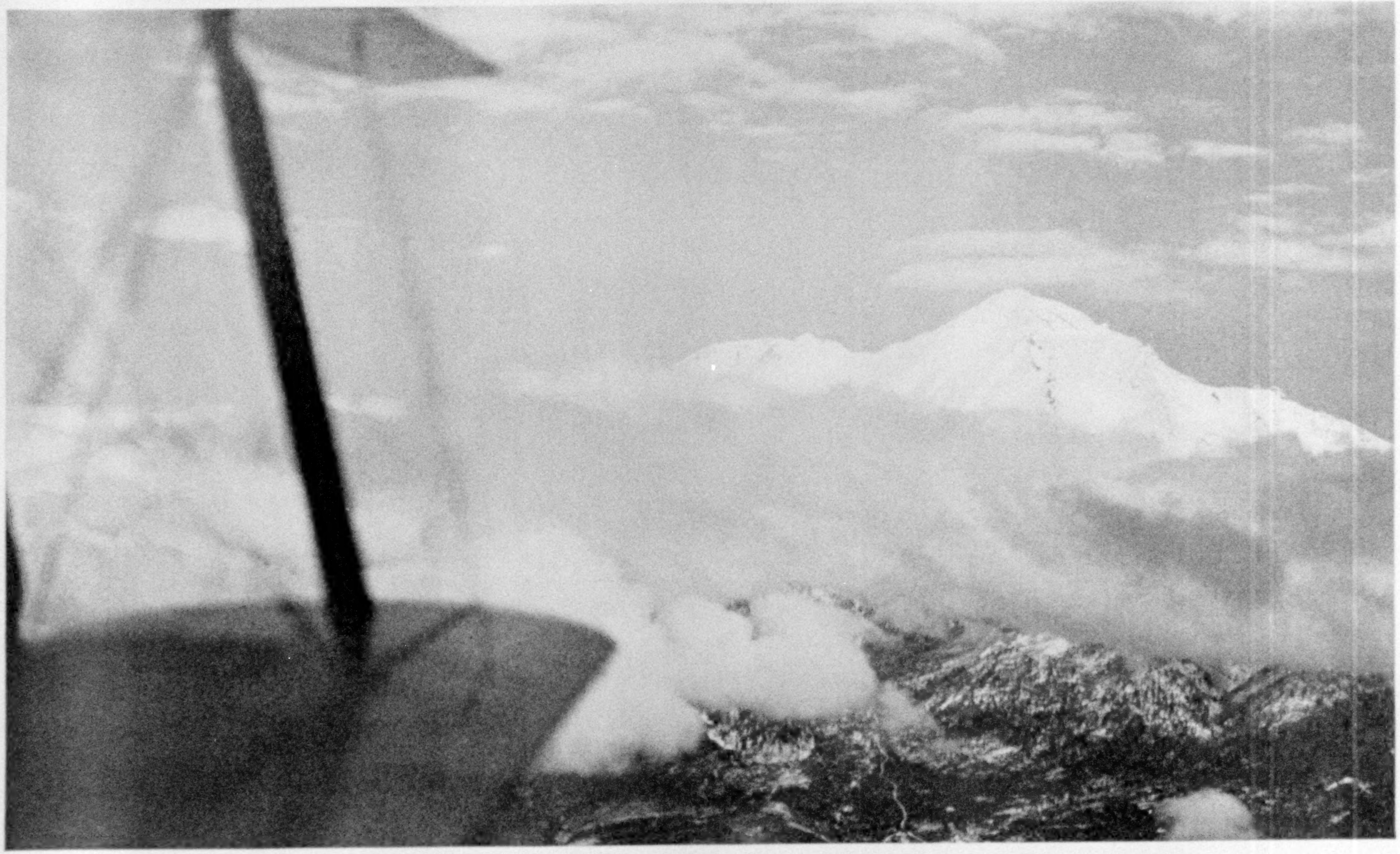
The irregular topography yields southward-facing slopes, which receive the full effect of the sun's rays, as well as northward slopes, cool, moist, and shady, where they are little felt. The altitude ranges from 2,500 feet in the foothill belt to more than 13,000 feet along the crest of the Sierra Nevada.

It is probable that the first white men to look upon Yosemite Valley were members of the Joseph R. Walker Expedition of 1833, which descended the western slope of the Sierras. This expedition apparently did not go down into the valley, and the effective discovery was not made until 1851, by members of the Mariposa Battalion while in pursuit of hostile Indians.

The first white men who frequented this Yosemite hinterland were miners, sheep herders, and cattlemen. Then came surveyors and soldiers to guard the mountain meadows and forests. And, lastly, the tourist, at first a little group at long intervals, but now in throngs, to see the glories of the mountains. The first systematic reconnaissance of the region was made by the California Geological Survey, between 1863 and 1867.

WILD FLOWERS AND WOODED LOWLANDS MERGE

California has many showcases for the display of her diversified wares provided by a beneficent Nature. In the high Sierras are the snow plants, peeping inquiringly and a bit nervously through the snowcaps when the first warmth of spring moves the solid pack to mushy activity (see Color Plate XI). Farther down the slopes, lichens, mosses, sundry family

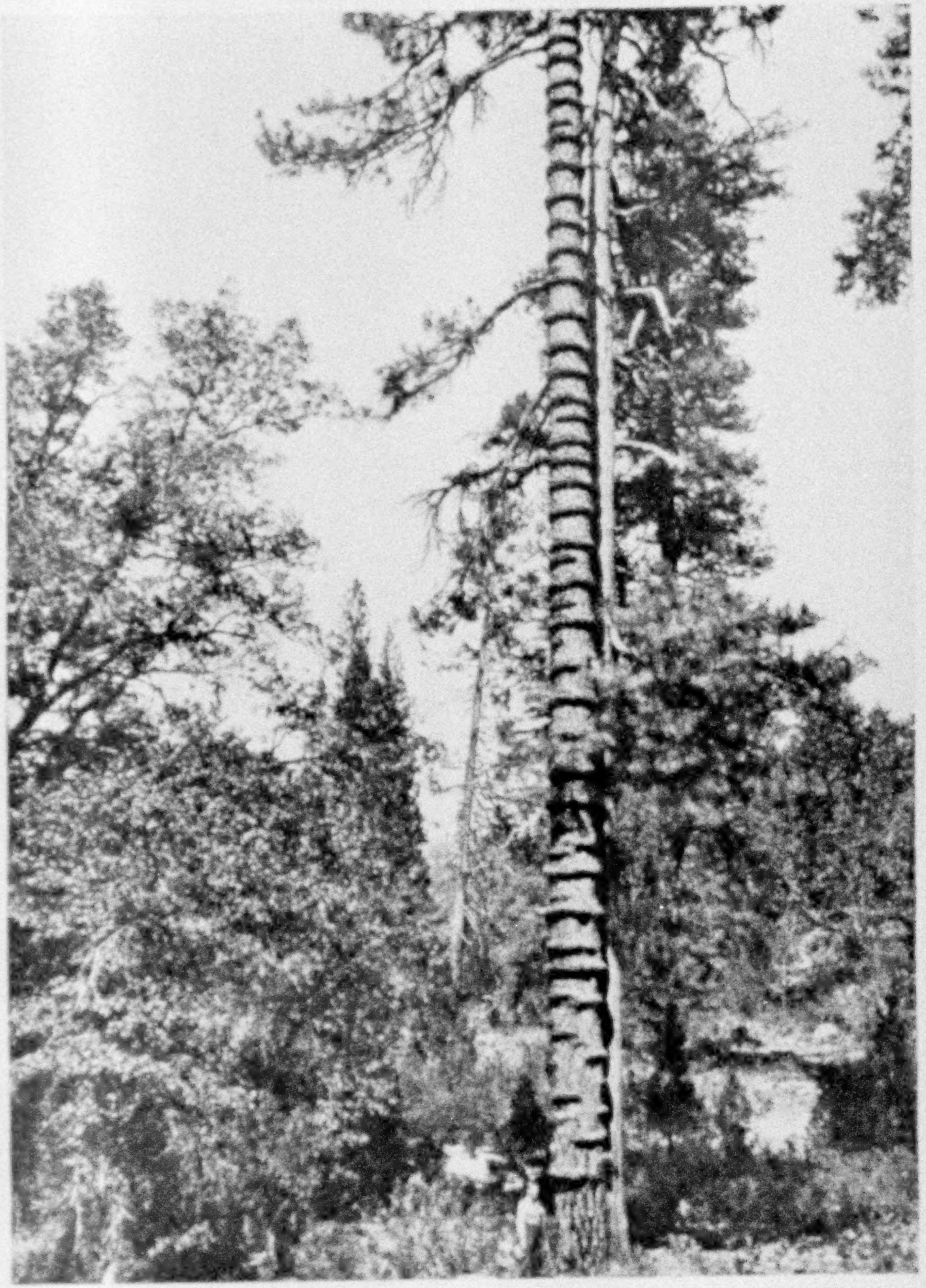


SHASTA'S MAJESTIC PYRAMID, SHROUDED IN UNSULLIED SNOWS, DOMINATES THE NORTHERN CALIFORNIA LANDSCAPE

Rising more than 14,000 feet, this is one of the highest mountain peaks of the United States. Its ascent in the summer months is not dangerous, and many mountain-climbing enthusiasts enjoy the marvelous view that unfolds from its summit.

Photograph by Boysen

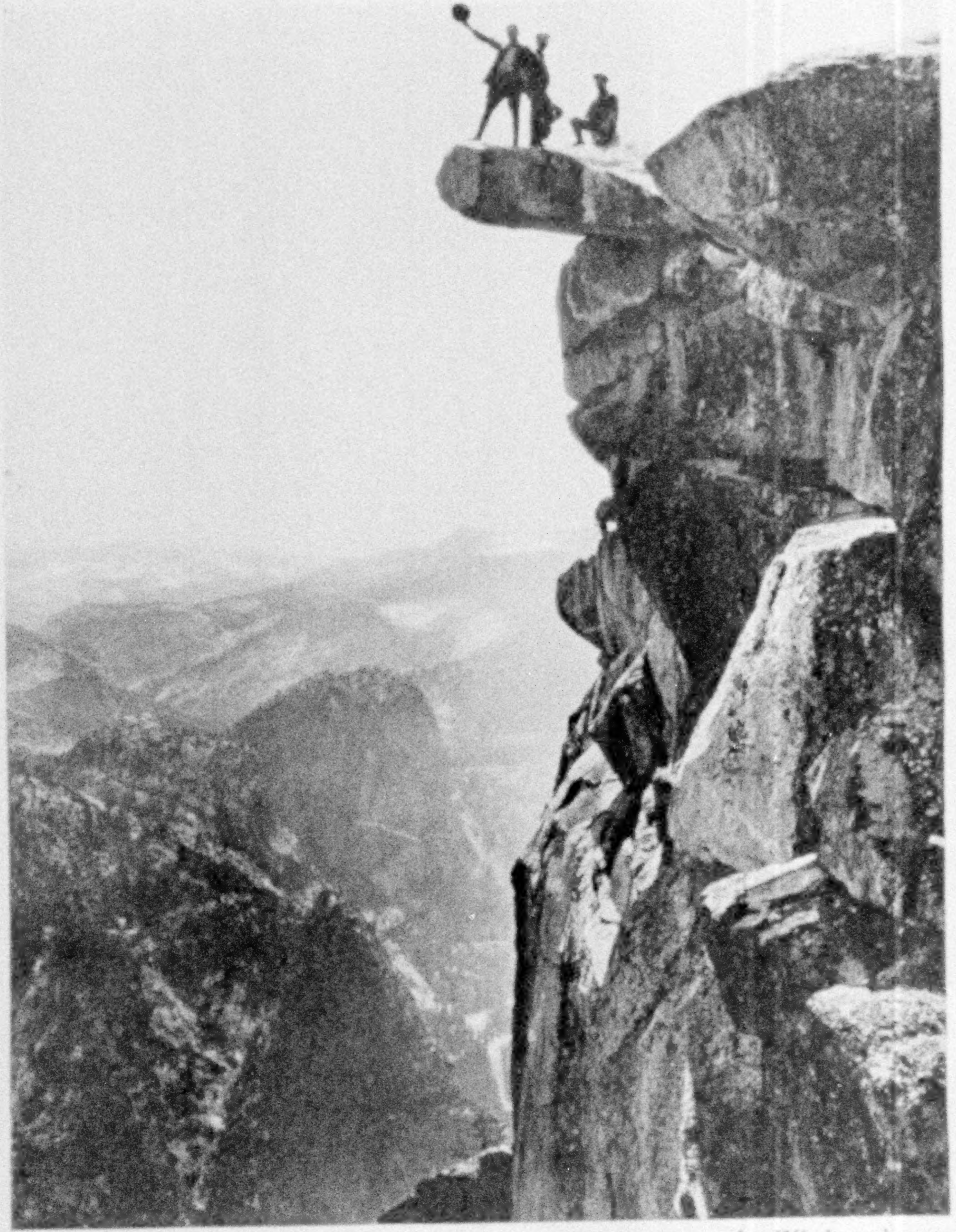
QUIET SYLVAN CHARM AND WILD UPLAND GRANDEUR COMBINE TO WEAVE THE SPELL OF YOSEMITE'S ENCHANTED VALLEY



Photograph by Hans Tittel

SAPSUCKER DECORATIONS ON A HETCH HETCHY VALLEY PINE

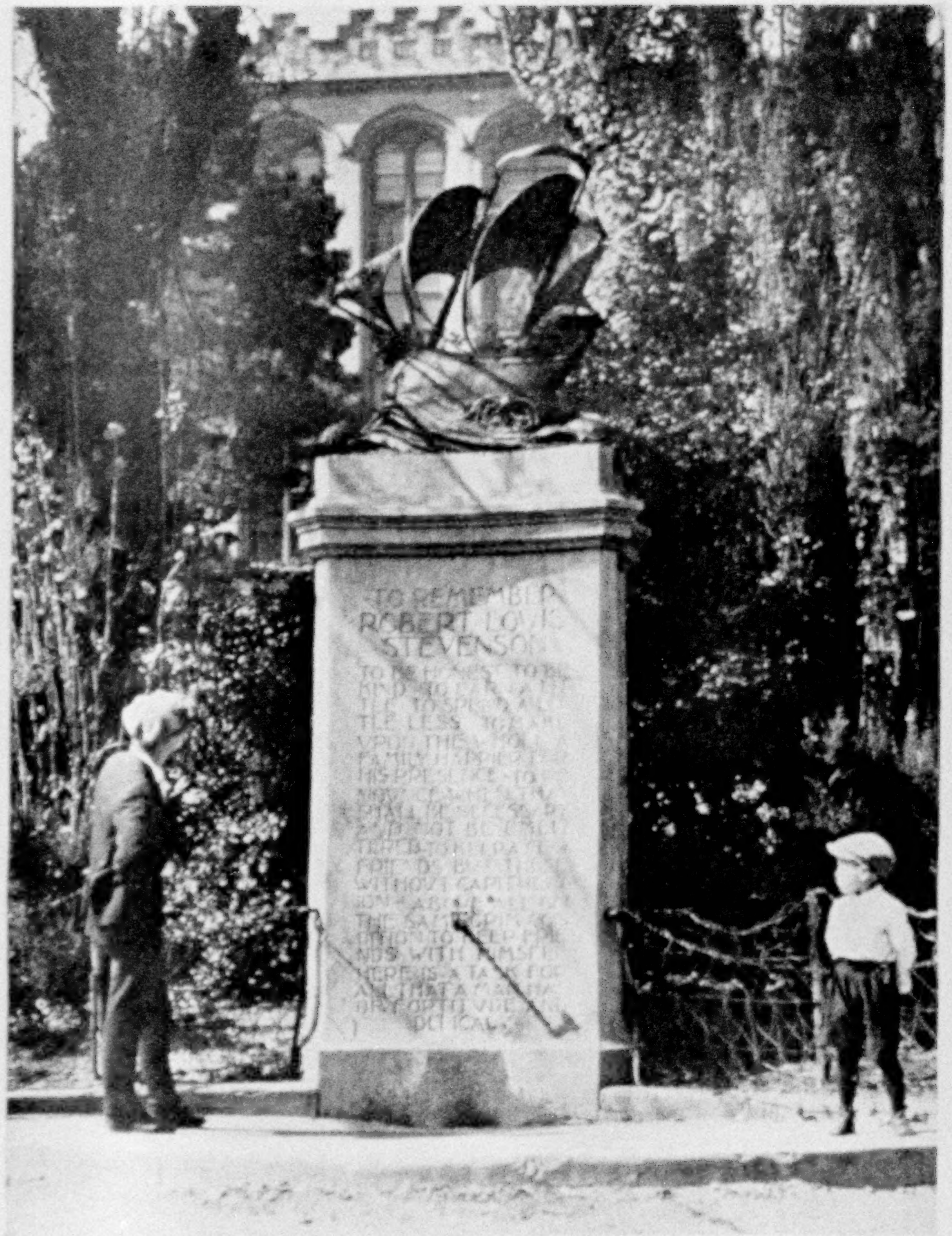
Year after year the birds returned to the same tree and drilled their holes into its bark. To repair the damage effected by their ravages, the tree rings have grown thicker at each point of attack.



Photograph by Alexander Wiederseder

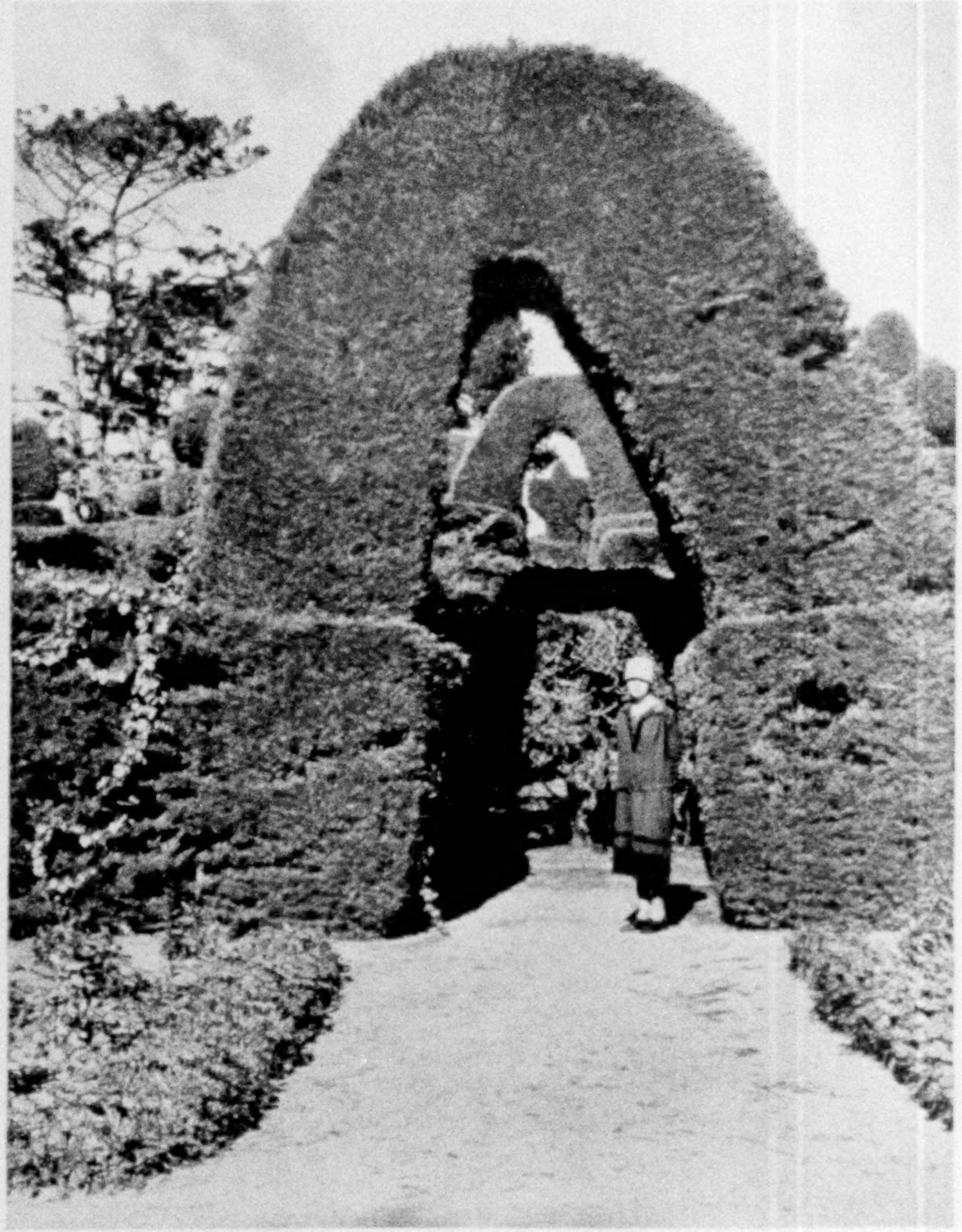
THE OVERHANGING ROCK AT GLACIER POINT, YOSEMITE

From this point of vantage a superb panorama of mountain, lake, forest, and canyon is revealed. If the men on the rock should lose their balance, they would travel straight down for nearly two-thirds of a mile.



SAN FRANCISCO HONORS A FAMOUS MAN OF LETTERS

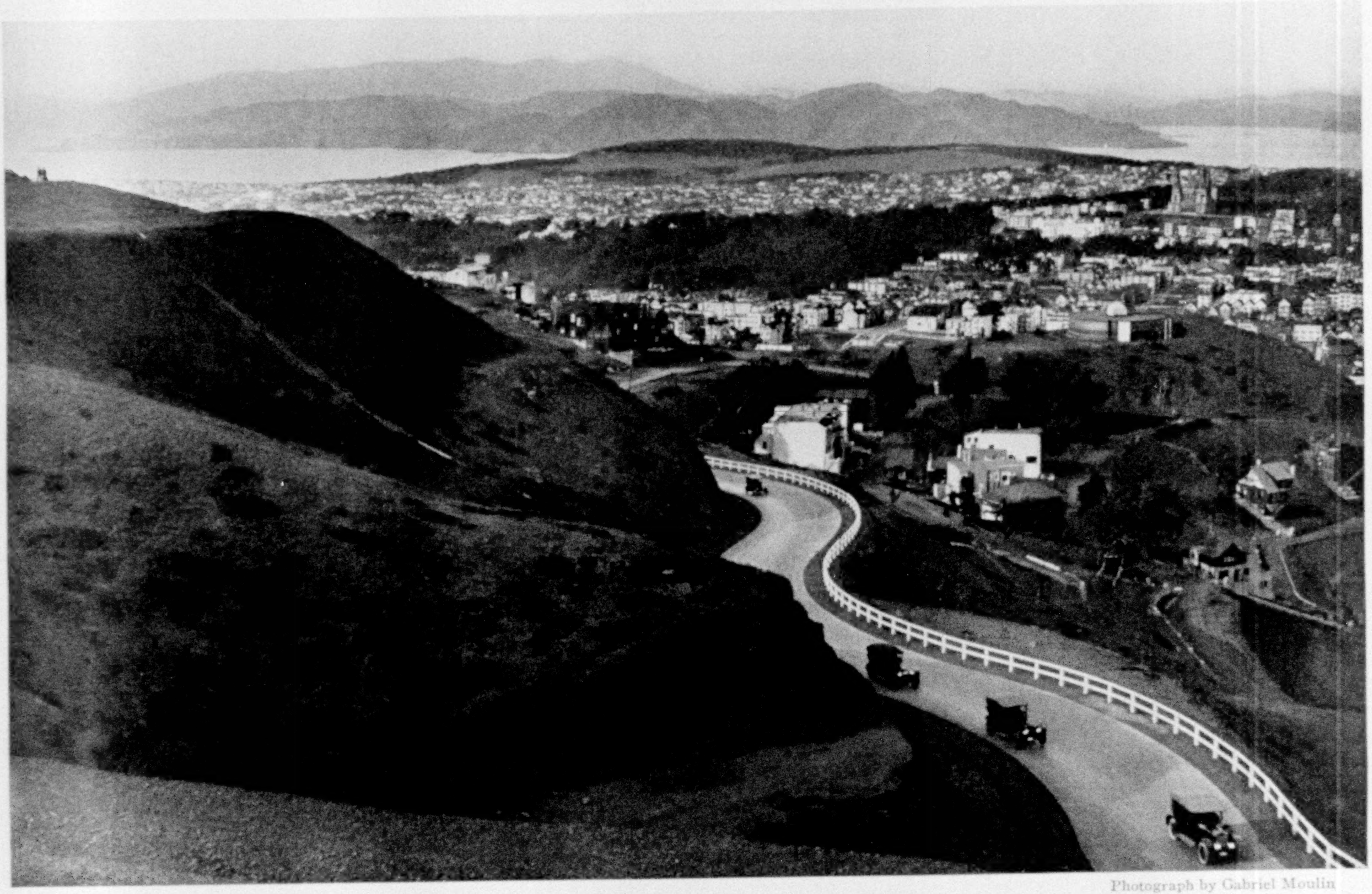
The stone block surmounted by a bronze ship in full sail was erected to the memory of Robert Louis Stevenson, much of whose literary work was done in California. He sailed from San Francisco in June, 1888, on that prolonged voyage through the South Seas from which he never returned.



Photograph by Charles Martin

A MYSTIC MAZE AT DEL MONTE

Among the remarkable features of this beautiful and extensive floral park near Monterey is its maze of growing plants. It is modeled after the famous maze at Hampton Court, England. Near by are a classic solarium and an open-air Roman plunge filled with circulating and heated salt water.



Photograph by Gabriel Moulin

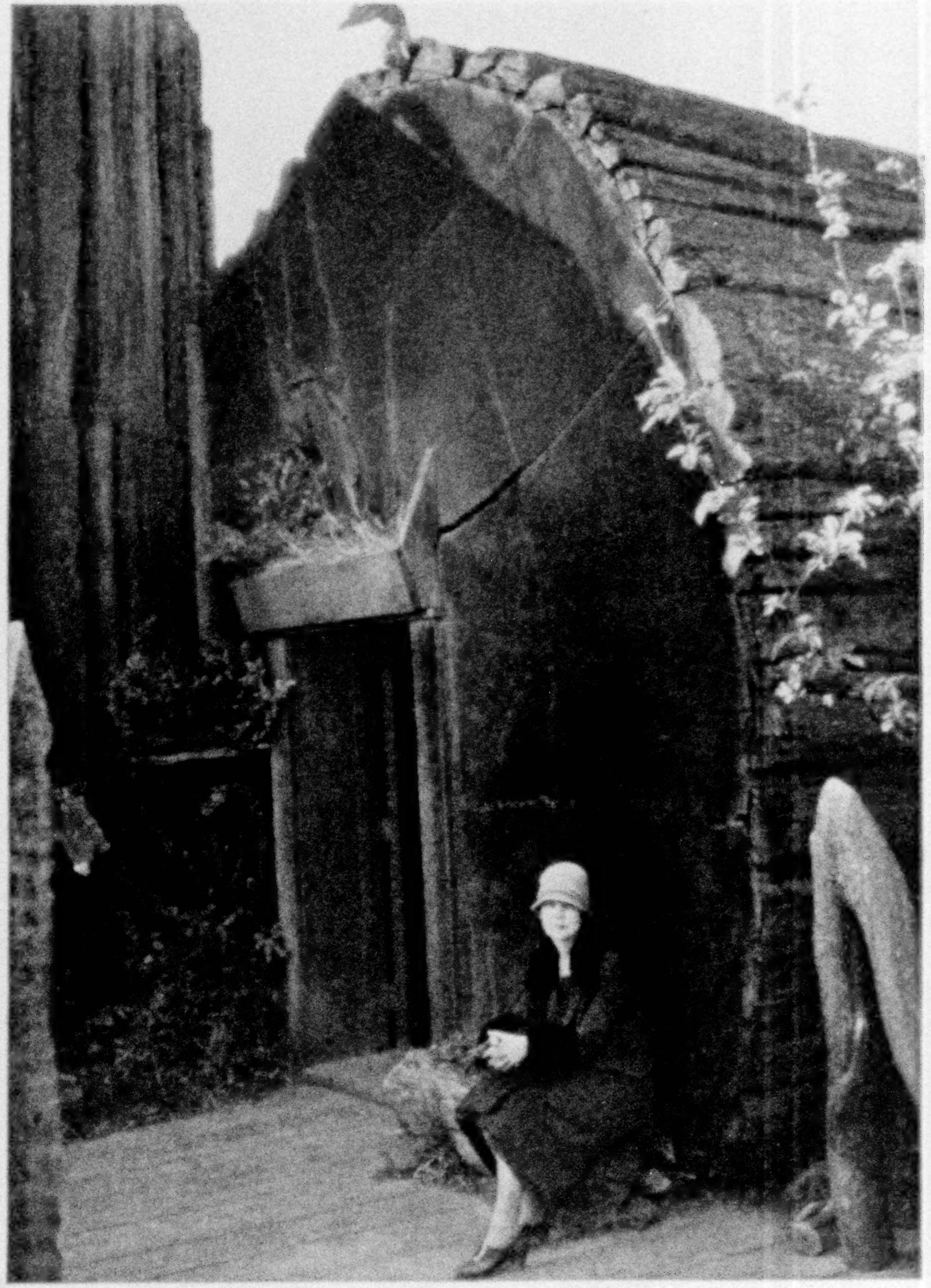
THE CITY OF THE GOLDEN GATE VIEWED FROM TWIN PEAKS

These "young mountains" are near the geographical center of San Francisco and the higher one reaches an elevation of nearly 1,000 feet. The outlook from it takes in practically the whole city and the wide sweep of the bay as well. In the distance, at the left, the Golden Gate is visible.

Photograph by Lindley Eddy

TWO REPRESENTATIVES OF THE "SPIRIT OF SEQUOIA"

On July 10, 1927, this tablet was dedicated in Sequoia National Park, commemorating the National Geographic Society's gift of giant trees to the American people (see illustration, page 733). Hon. Stephen T. Mather, at the left, formerly Director of the National Park Service, was one of the most generous contributors to The Society's fund for the acquisition of the Sequoias.



Photograph by Charles Martin

ONE WAY OF LIVING IN A TREE

At Eureka, in northern California, a giant log of redwood has been hollowed out, fitted with windows and doors, and is used as a residence and curio shop. Summer heat and winter cold, as understood in most parts of the United States, seldom make themselves felt in Eureka, where the range of average mean temperature throughout the year is less than 10 degrees.

groups of ferns, and many varieties of wild flowers merge into the wooded lowlands, where, especially north of the Tehachapi Mountains, the live oak spreads its shapely limbs and often affords protection while adding beauty to the pasture land, where herds of fat Herefords (see Color Plate III) browse.

In the northern part of the State roses grow with little cultivation, but with the profusion of goldenrod in Pennsylvania. No mere bushes suffice for the wealth of blossoms. They grow on trees, often to a height of 12 feet or more, and curious results of intergrafted varieties are sometimes found in freakish but delightful array on a single tree. In Santa Cruz arbors cover the sidewalks of some of the streets, and over these roses, intertwined with geraniums, climb and rest in clusters (see Color Plate V).

The people of Santa Cruz are flower-minded. Besides the roses and geraniums, sweet peas are cultivated, literally by the acre (see Color Plate XXI). There are few more beautiful vistas for which mere man is responsible than these dainty flowers displayed wholesale. The adaptability of the tracery of vines to house exterior and garden beauty-making is not lost sight of, the Bougainvillæa being found in artistic draping over many a charming home (see Color Plate XX).

WILD FLOWERS OF THE SOUTH

Though the cultivated flowers which abound are beautiful and varied, all the way from the sand dunes, Scotch broom, and rhododendrons of Crescent City, which is almost the last outpost in California before the Redwood Highway reaches the Oregon line, to Ramona's garden, in San Diego, only a few miles from the Mexican border, it is to the "wide open spaces," the desert and mountain sides of the southern part of the State, to which we turn in chief appreciation (see Color Plates IV, V, XVII, and XXIV).

A mountain side, perhaps 20 miles in extent, covered with a mass of yellow poppies, is an eye-filling stage setting; but this is only a beginning, for at its base, in equal or in greater extent, may be almond and cherry orchards all abloom and seeming to be set on a cloth of poppy gold. In March and April hundreds of square miles are billowy with blossoms. In the perspective may be a series of orange or lemon groves, their trees laden with delicate blooms, while at one's back may stretch for unnumbered miles the desert in its bright dress of spring.

SAN FRANCISCO IS A FLOWER CENTER

The flower lover may acquire a liberal nontechnical education during an automobile journey from one end of California to the other. He may see and study the snow plant (see Color Plate XI) under the dome of Shasta, dip into the wonderland of plant and flower life at the experimental farm of the late Luther Burbank, near Santa Rosa, or wander through San Francisco's Golden Gate Park, where he finds practically every variety of flower and plant that will grow under a kindly sun.

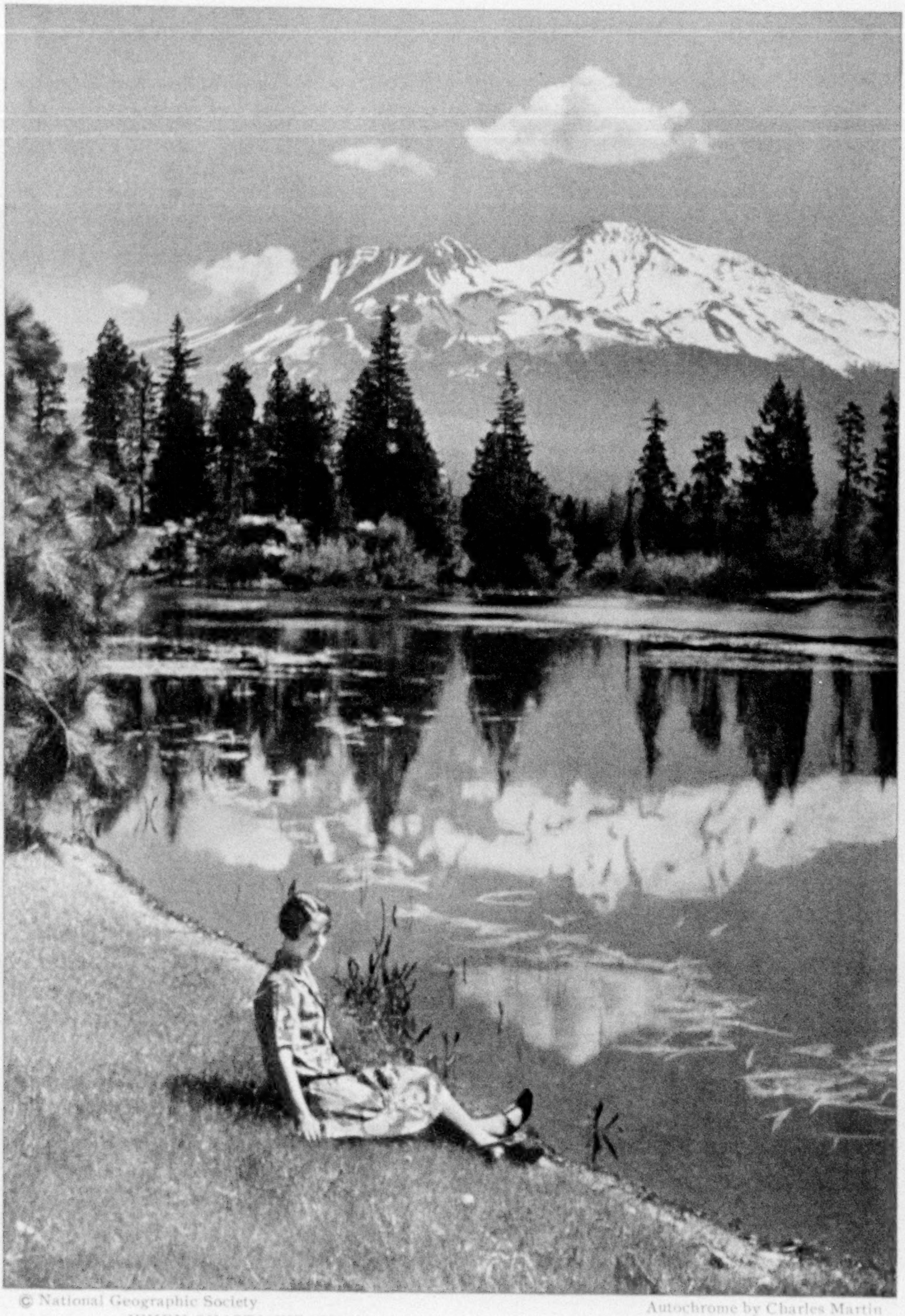
Looking at this park's range of trees, shrubs, flowers, trails, meadows, hills, and small mountains, one finds it hard to realize that in 1871 there was scarcely anything except sand on the entire site of more than 1,000 acres.

In its present form the park is a testimonial chiefly to the 42 years of horticultural and forestry experience devoted to it under the supervision of John McLaren, park superintendent, who has obtained plants and shrubs from every corner of the globe. Many acquisitions have been the result of trades with nurserymen elsewhere. More than 4,500 varieties of plants are now propagated here.

The outstanding pride of this park is its thousands of rhododendrons. Himalayan varieties are in preponderance, followed closely by natives of California, Oregon, Washington, and the Carolinas. Especially conspicuous is the fragrantissimum, which attains a height of 7 to 10 feet, with flowers four inches in diameter and so fragrant that the odor can be detected from a modest group nearly a city block away.

One of the National Geographic Society's expeditions to Yünnan Province, China, resulted in the addition of many hundreds of species of rhododendrons to the Golden Gate Park collection.*

*See "The National Geographic Society's Yünnan Province Expedition," by Gilbert Grosvenor, LL. D., in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1925.



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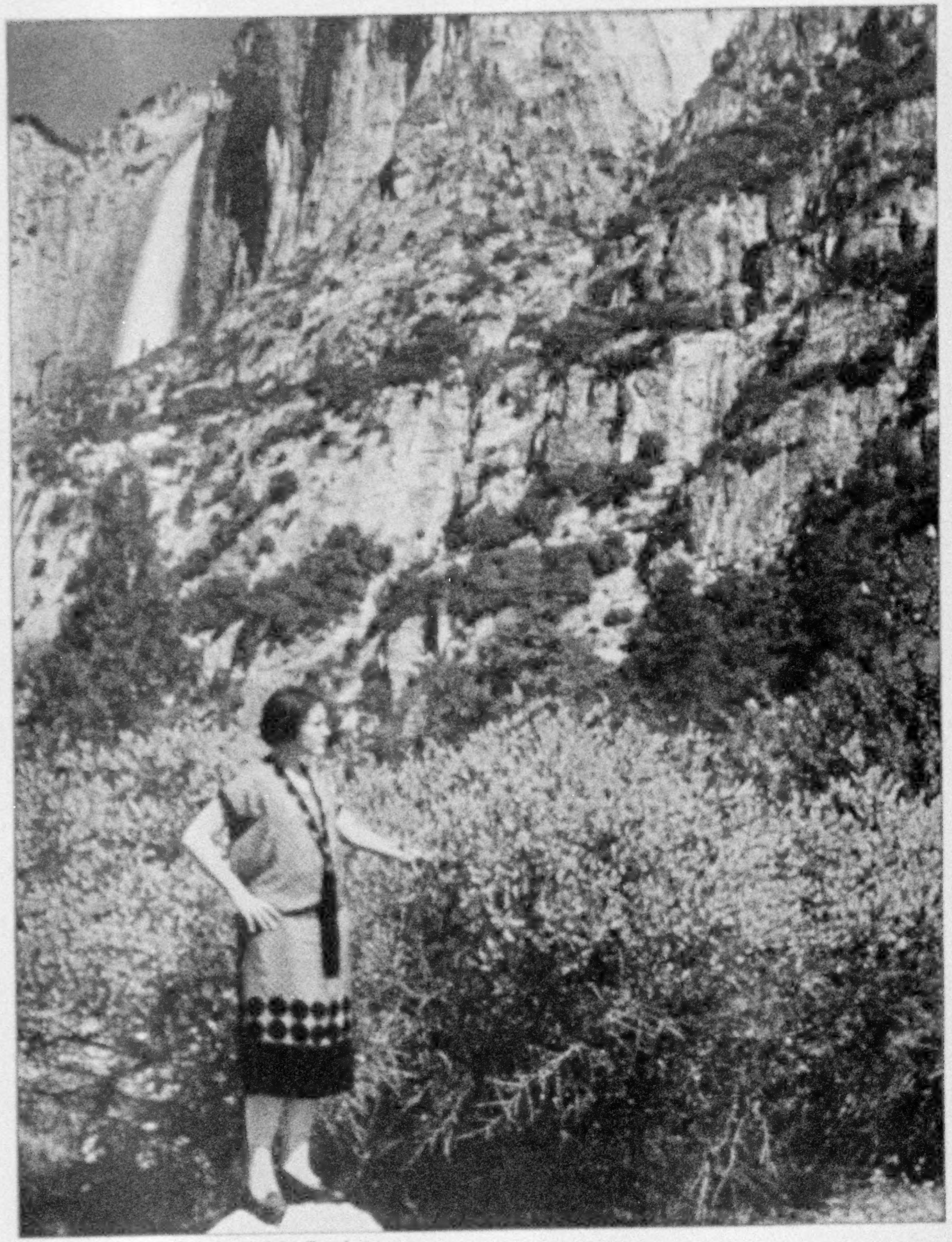
Autochrome by Charles Martin

WHEN SHASTA WEARS NO HOOD, STILL POOLS REFLECT HER IMAGE

Indian legend has it that the Great Spirit built this mountain as a model for all others. Tribal prophets say stormy weather never threatens when the peak is clear of clouds.



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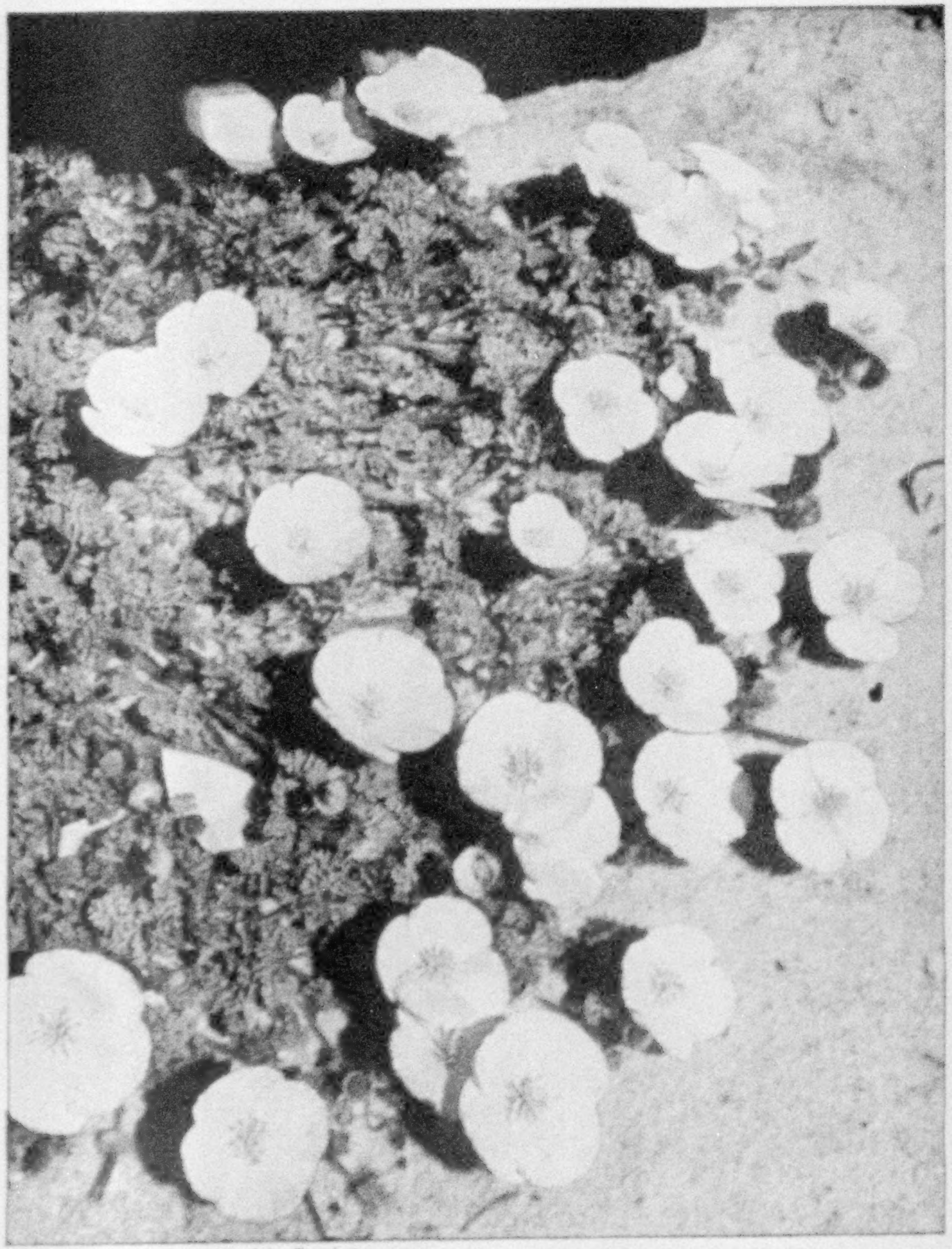
BLUEBLOSSOM FILLS THE DELLS NEAR YOSEMITE FALLS

These charming shrubs, erroneously called "blue lilacs," are of the Ceanothus family.

Autochromes by Charles Martin

MOST SANTA CRUZ SIDEWALKS ARE FLOWER BORDERED

Dwellers in this city of gardens edge the stroller's path with banks of loveliness.



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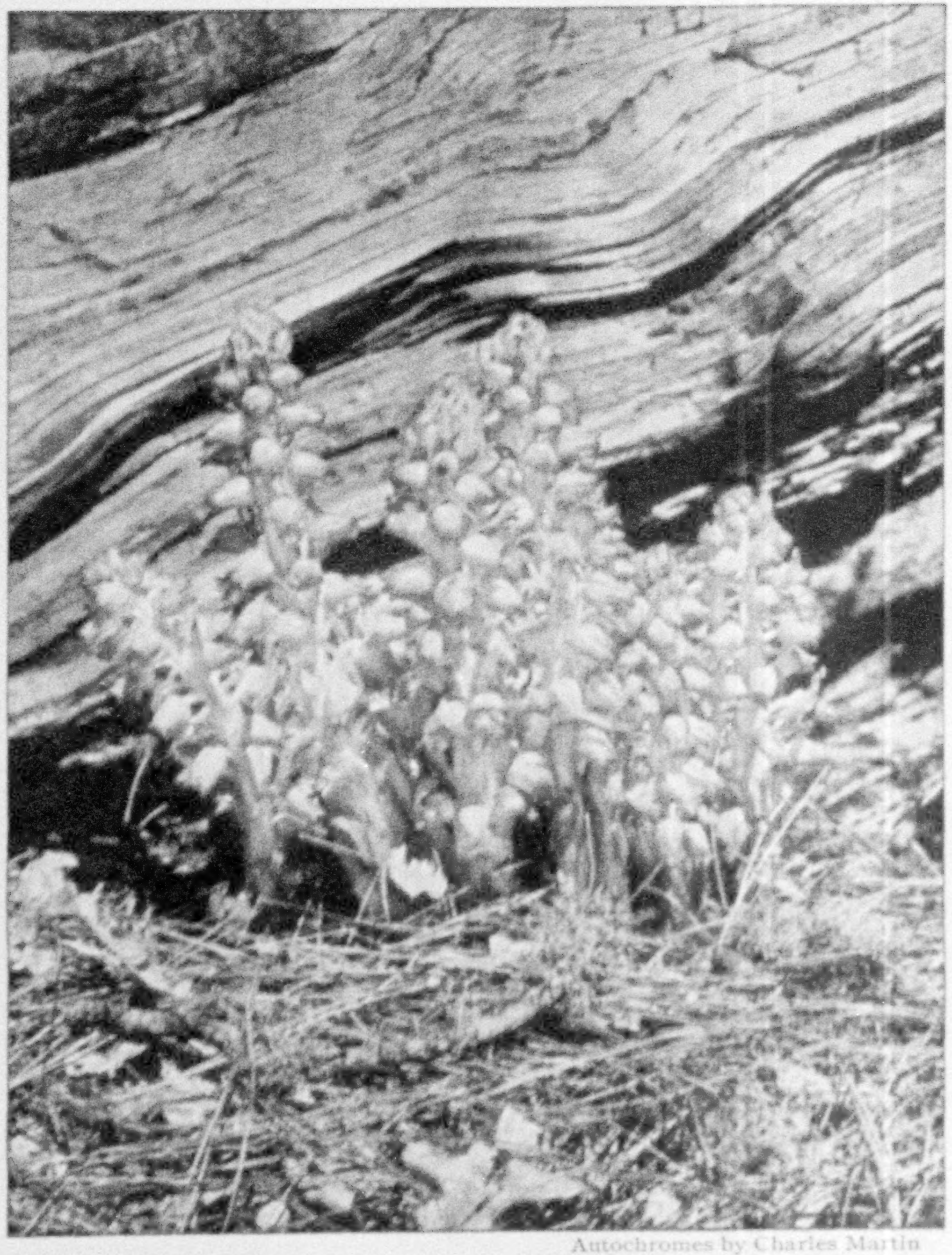
HAPPY CALIFORNIA-POPPIES RADIATE GOOD CHEER

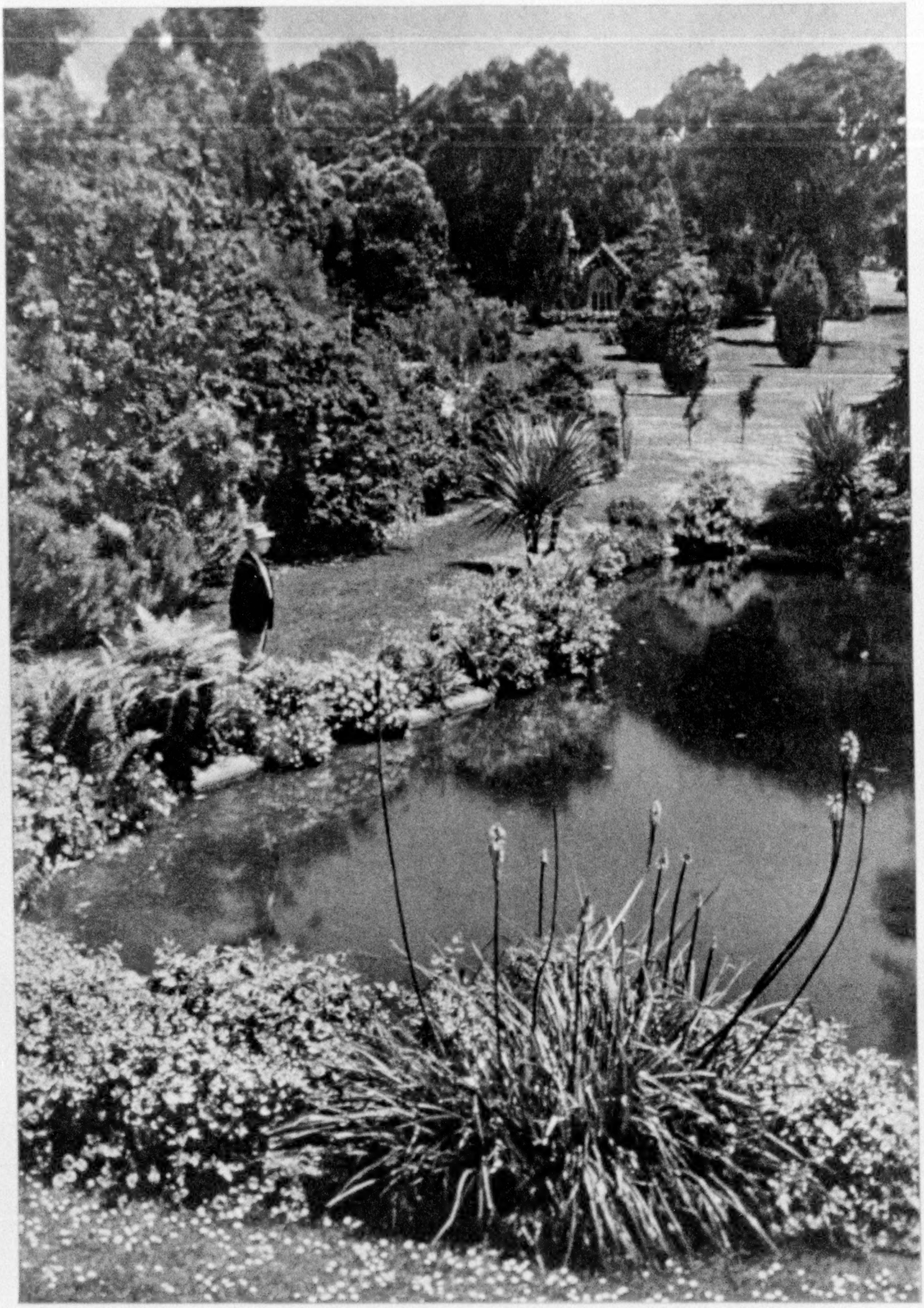
The Monterey countryside teems with the State flower, spirit of the sunshine and the golden West.



Autochromes by Charles Martin

THE SNOW PLANT FOLLOWS PASSING WINTER'S STEPS

These rare, exquisite flowers spring up as the snow melts. They are protected by special park regulations.



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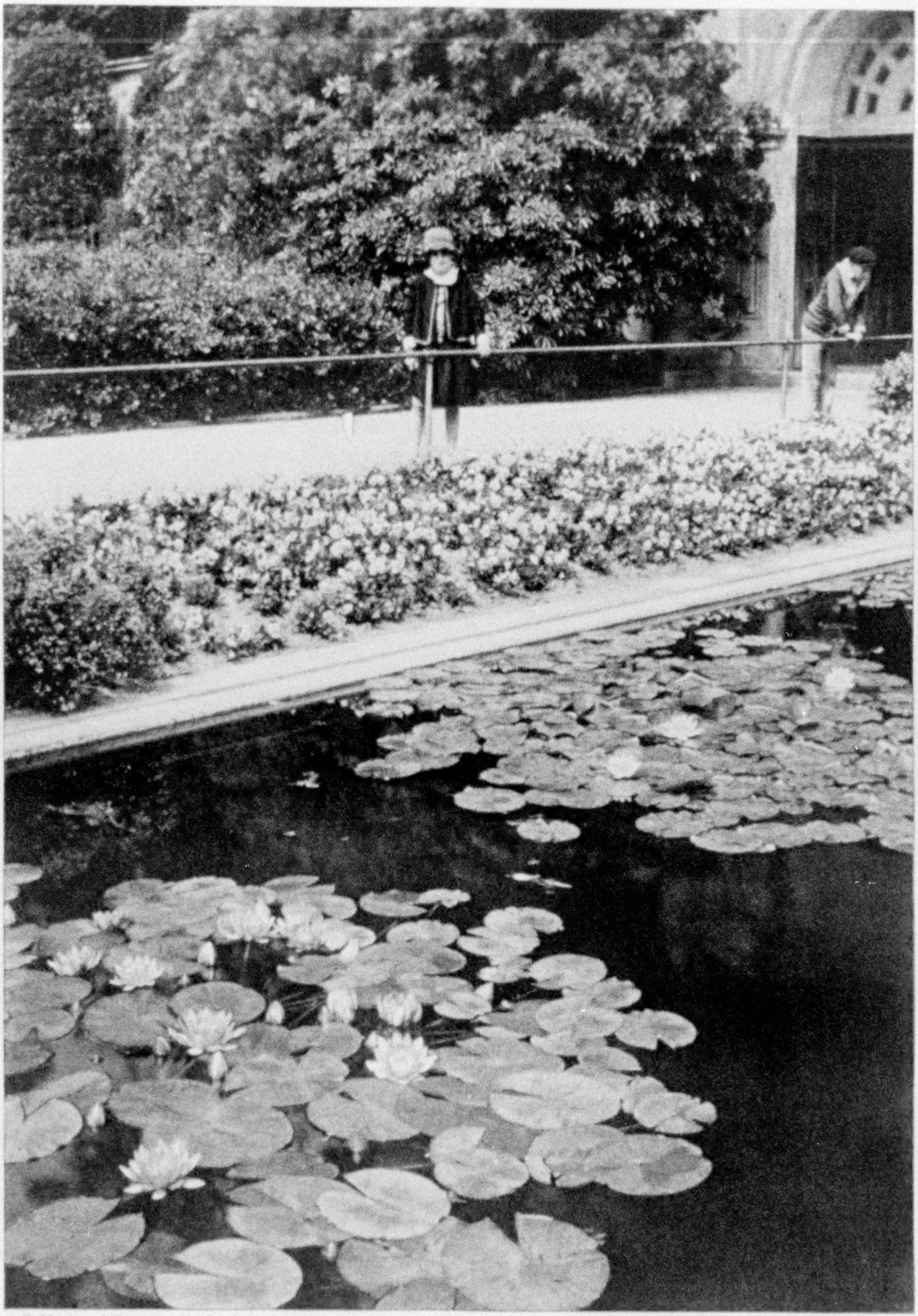
SAN FRANCISCO SUBURBS ARE A LANDSCAPE ARTIST'S DREAM

Still pools, green lawns, spreading trees, and flowers everywhere make a vision of delight.



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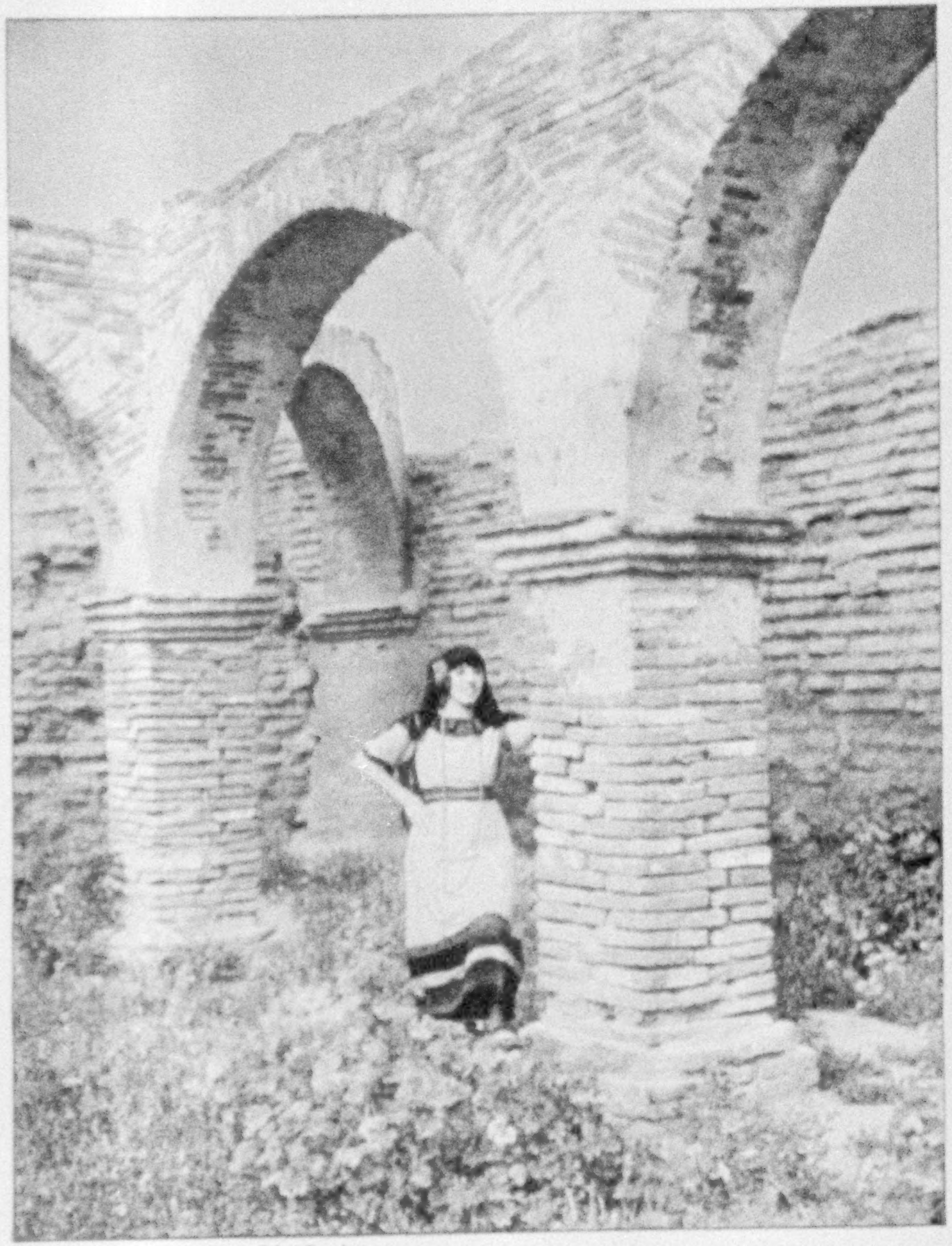
WATERLILIES IN THE POND VIE WITH PANSIES ON THE BANK

In San Diego the beauty lover is lured to sequestered nooks where every sense is charmed.



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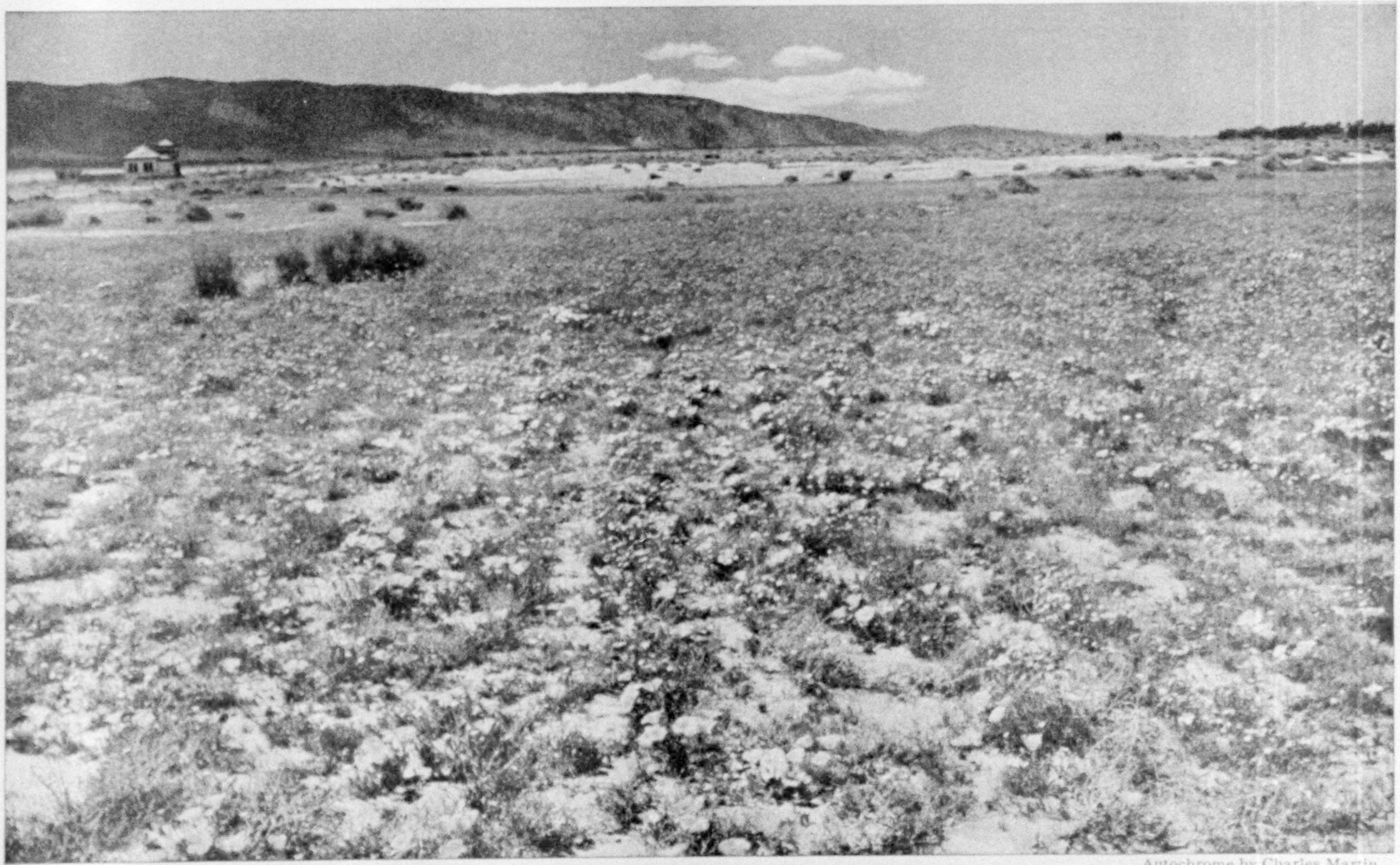
RUINS OF SAN JUAN CAPISTRANO MISSION RECALL THE PAST

Autochromes by Charles Martin

SEASIDE FLEABANE NODS AMID YELLOW DAISIES AT MONTEREY



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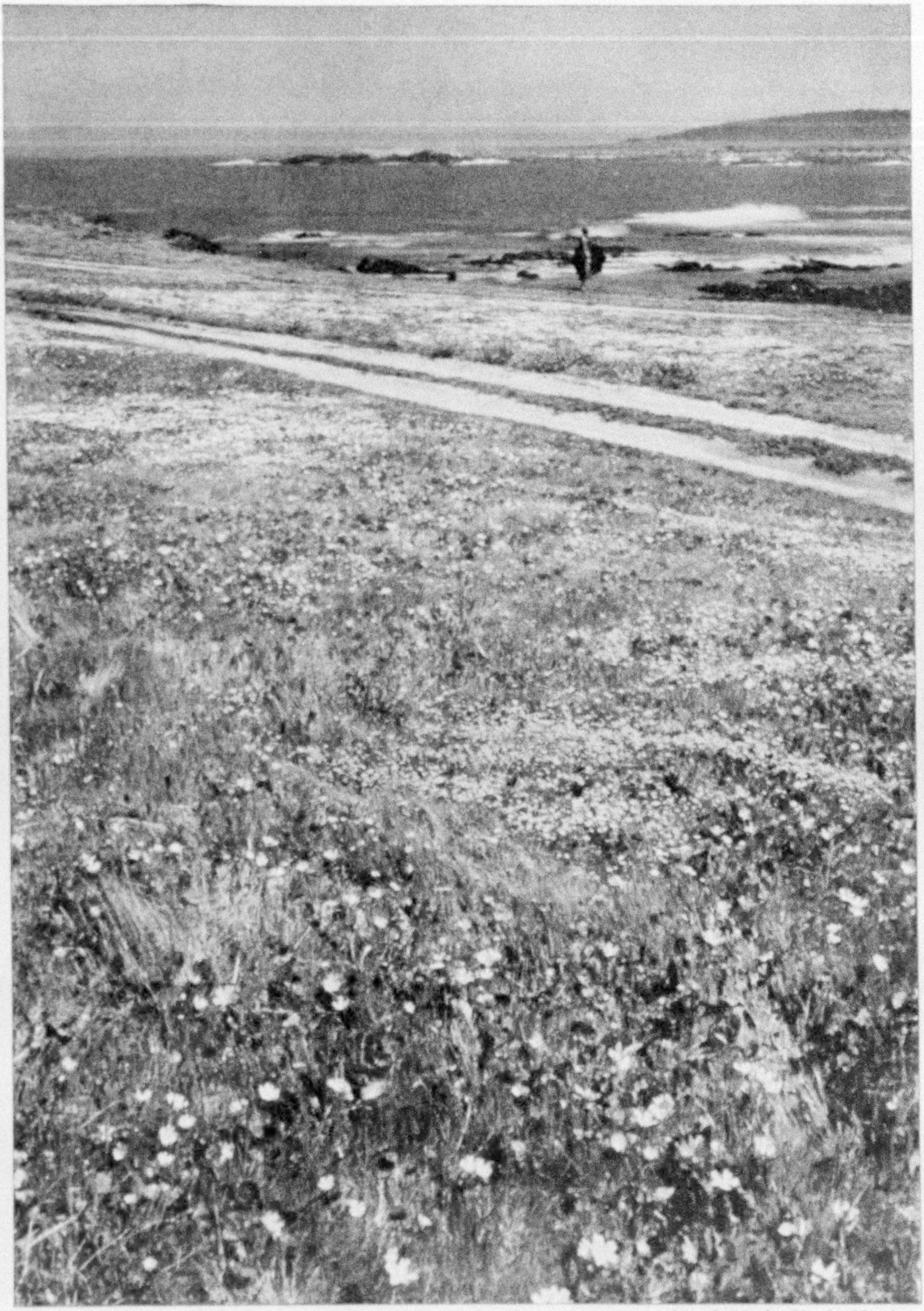
CALIFORNIA-POPPIES AND GILIA WEAVE A RUG FOR ANTELOPE VALLEY



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SEVENTEEN MILE DRIVE, NEAR MONTEREY, WINDS THROUGH FIELDS BESPRENT WITH CHECKERBLOOM

California has countless varieties of wild flowers, but none prettier than these that bloom in pink loveliness by lonesome trails. Plants of the daisy family gleam golden in the background.

In a report made in April of this year on the National Geographic Society's gift, the park superintendent says:

"Several years ago we received, through the kindness of the National Geographic Society, a collection of rhododendron seeds, most of them having been gathered in western China by Dr. Joseph F. Rock, under The Society's auspices. We were successful in germinating the majority of these seeds, and for the past month or so many of them have been coming into blossom, for the first time in this country. It is not an exaggeration to say that these constitute both a striking color display and a very interesting botanical exhibit and will undoubtedly mark a new departure in the cult of the genus Rhododendron locally.

"One species which we have been growing for some time, but of which, until receiving The Society's seed, we failed to appreciate the full possibilities, is *Rh. chartophyllum*. The new forms now flowering here are much superior in color, size of flowers, and fragrance, and, combined with the natural grace of the whole plant, serve to indicate the place this striking species is bound to take in the parks and gardens of the future.

"Many forms are yet too small to have borne flowers, and it may be years before we are able to estimate fully the debt we owe to the National Geographic Society and to Dr. Rock."

There are many elaborate private gardens in San Francisco (see Color Plate VII) and down the peninsula south of that city.

FLOWERS SHIPPED TO ALL PARTS OF THE UNITED STATES

The cosmopolitan charm of San Francisco is recognized around the world, but it is not as generally known that it takes front rank in the production, propagation, and distribution of flowers. There are more than 200 flower markets and shops in the city. These are augmented by a score of organizations and individuals whose business is the shipment of flowers throughout the United States. San Francisco has one of the world's largest nurseries for blooming flowers.

One grower has in production 40,000 orchid plants, one of the most extensive single ventures in the growth and distribution of that costly flower. This grower and one in Los Angeles control a large share of the orchid business in the United States.

Almost every known variety of blooming flower has been assembled in San Francisco from every part of the globe, and whenever a variety has had a tendency to become popular, some nurseryman has seized upon its cultivation as a specialty.

Thus, as Los Angeles and the south ship vast quantities of native flowers to whose cultivation thousands of acres are devoted, San Francisco is the center of hothouse development and the propagation of imported varieties grown under glass.

Probably two-thirds of all the flowers grown in San Francisco are importations from other climates, and have been nurtured into commercial assets. This is the more surprising because of the blossoms, which grow in profusion under natural conditions.

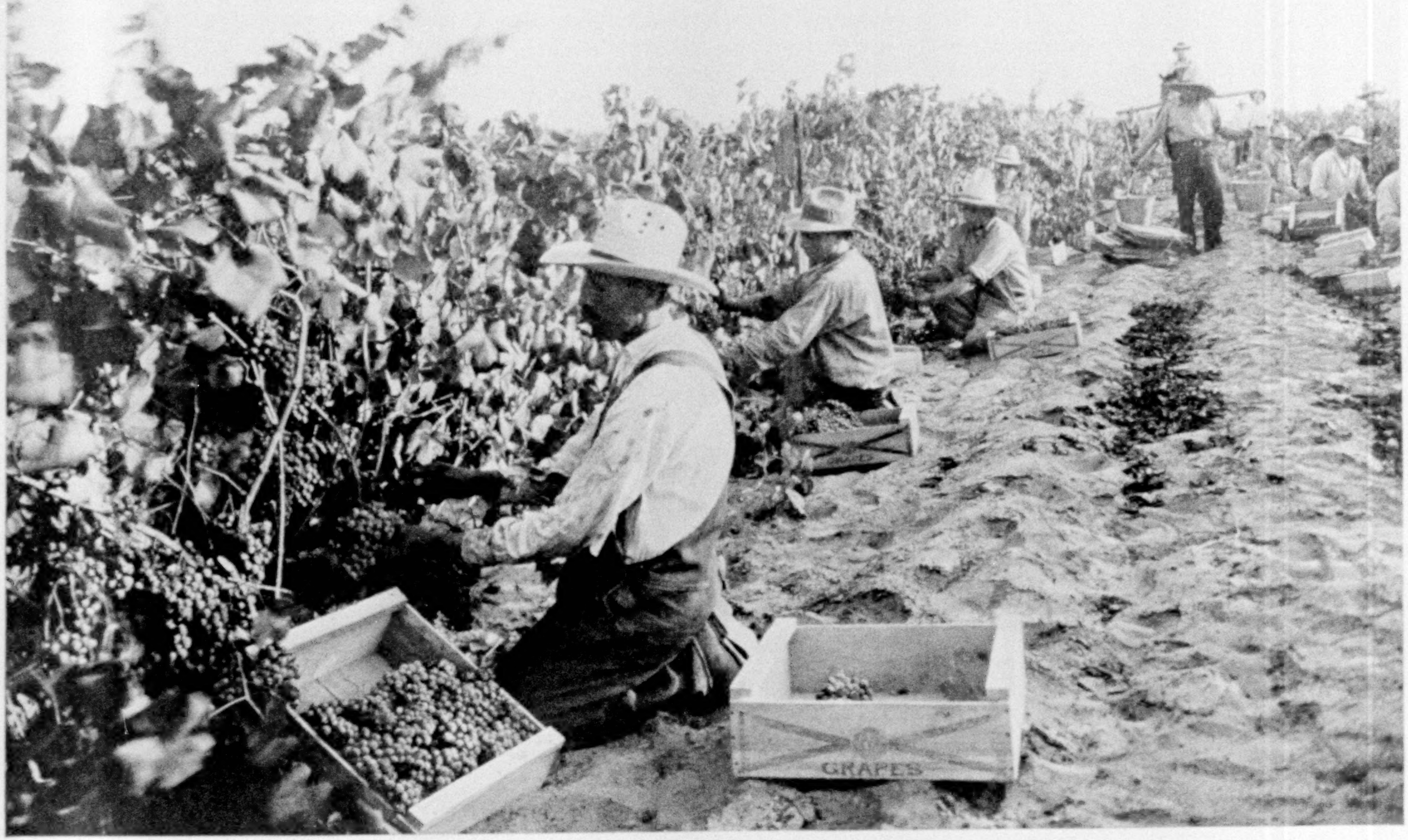
In addition to the many beautiful private gardens, the city's public park system, including the Golden Gate Park (see page 720), contains a wealth of color in bloom and gives to the flower devotee in that city what his fellow citizen elsewhere in the State finds growing at large.

MONTEREY, "WHERE CALIFORNIA BEGAN"

No seeker of the beautiful should miss Monterey, "where California began." Here the sunny waters of a landlocked bay make an ideal setting for a background of beauty whose areas, both natural and cultivated, offer wide range for the variegated output of Nature's workshops (see Color Plate XVI).

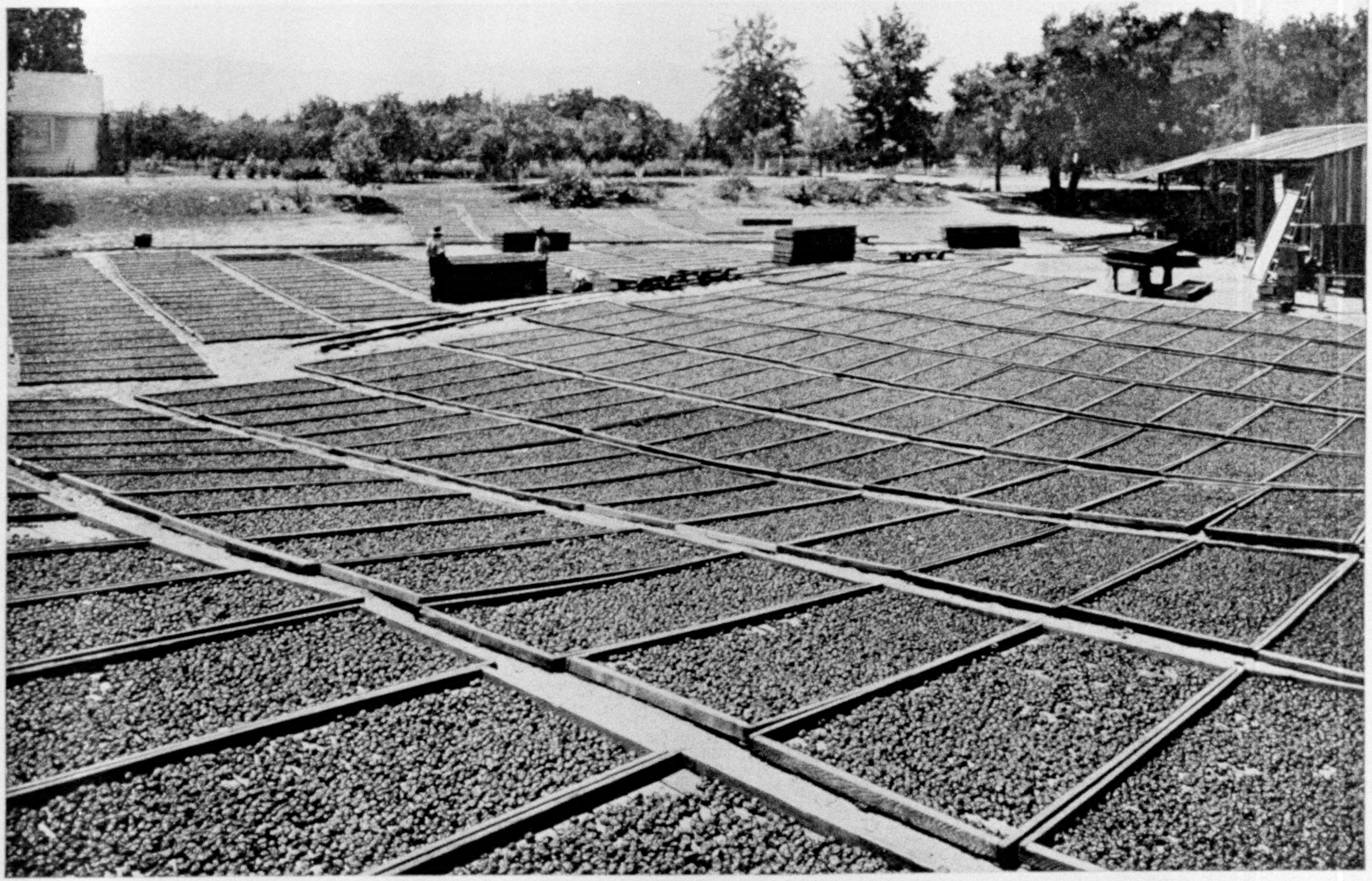
Monterey is a place of many beginnings. Besides being the first capital, it became the site of the first theater in the western land; the first wooden and brick houses were built here and California's first newspaper was printed here. For a time Robert Louis Stevenson, the "prince of dreamers," lived and worked in Monterey.

Near by is Carmel, and near Carmel the Mission San Carlos, in whose loving embrace forever sleeps Father Junípero Serra, the gentle Franciscan monk who



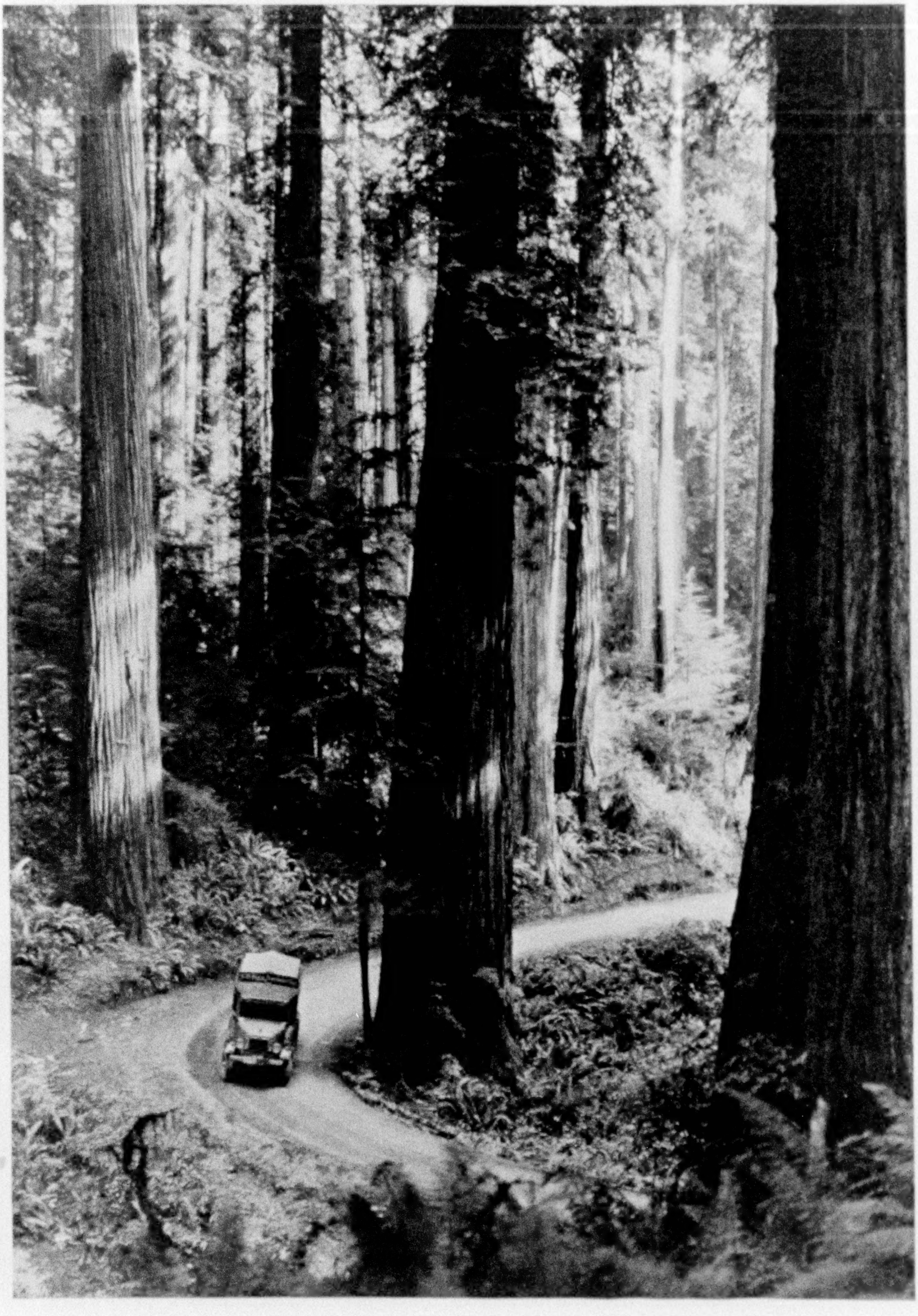
IN A CALIFORNIA VINEYARD

The pickers are harvesting a crop of Alicante Bouschet grapes, a single vine producing as much as 100 pounds. This popular "juice" grape, as distinguished from table grapes, finds a large market in the Eastern States. The development of modern methods of refrigeration for produce in transit has made it possible for California's fresh fruits to grace tables 3,000 miles away.



PRUNES DRYING IN THE FAMOUS SUNSHINE OF THE SANTA CLARA VALLEY

California's vast area and her diversity of climate make possible the cultivation of a great variety of fruits and vegetables. Two-thirds of all the dried prunes produced in the world come from this Nature-favored State.

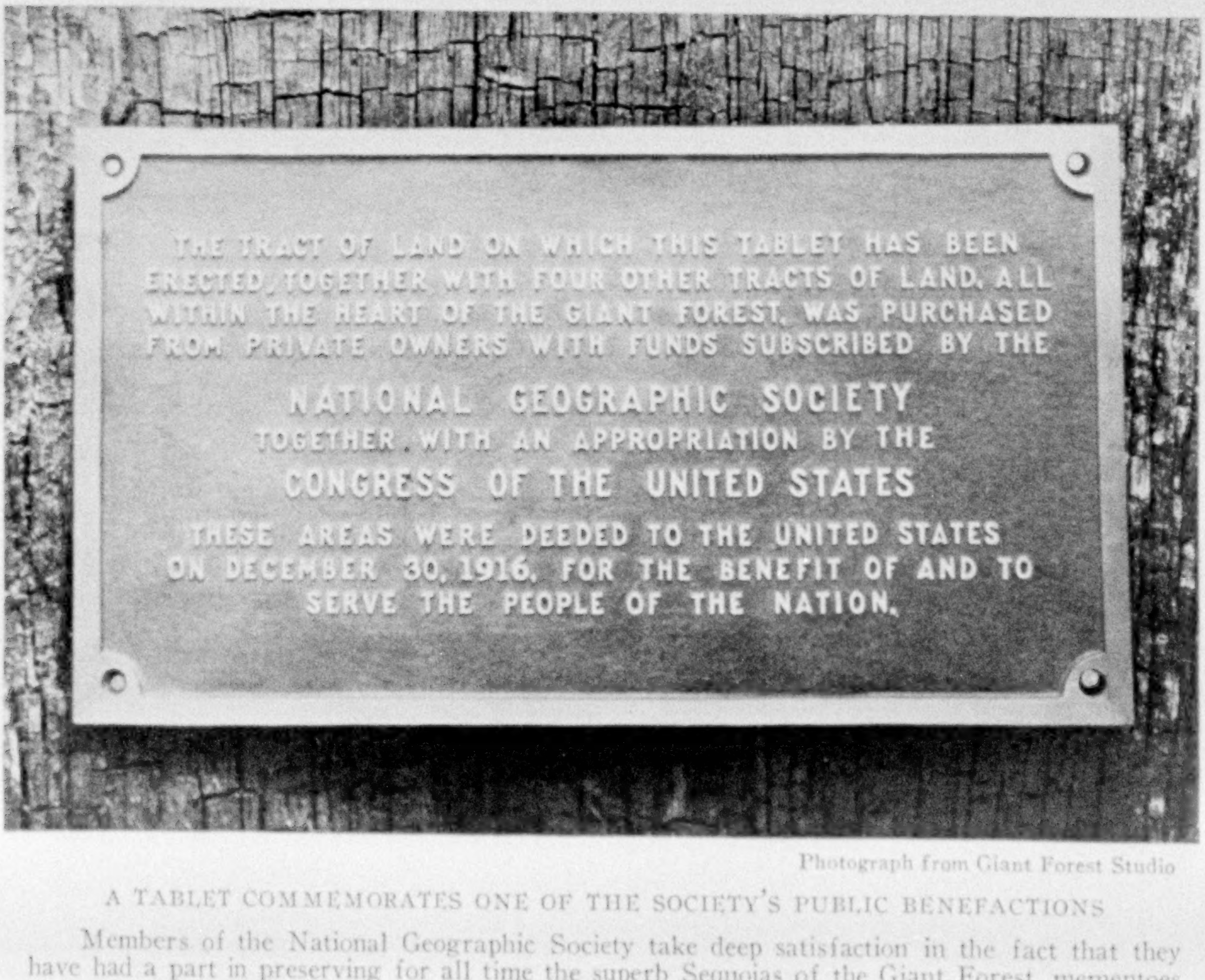


FERNS THRIVE ALONG THE "HIGHWAY OF THE GIANTS"

These mammoth trees were doomed to suffer the fate of thousands of their species and become railway ties, grape stakes, or lumber until an organization of Nature lovers was formed to save them. The redwoods once extended north through California from Monterey for about 450 miles, in a belt nowhere more than 40 miles wide. They are not found living anywhere else in the world.

Photograph by Hood

BILLOWS OF FOG ENVELOP MOUNT TAMALPAIS, NEAR SAN FRANCISCO



THE TRACT OF LAND ON WHICH THIS TABLET HAS BEEN ERECTED, TOGETHER WITH FOUR OTHER TRACTS OF LAND, ALL WITHIN THE HEART OF THE GIANT FOREST, WAS PURCHASED FROM PRIVATE OWNERS WITH FUNDS SUBSCRIBED BY THE

NATIONAL GEOGRAPHIC SOCIETY

TOGETHER WITH AN APPROPRIATION BY THE

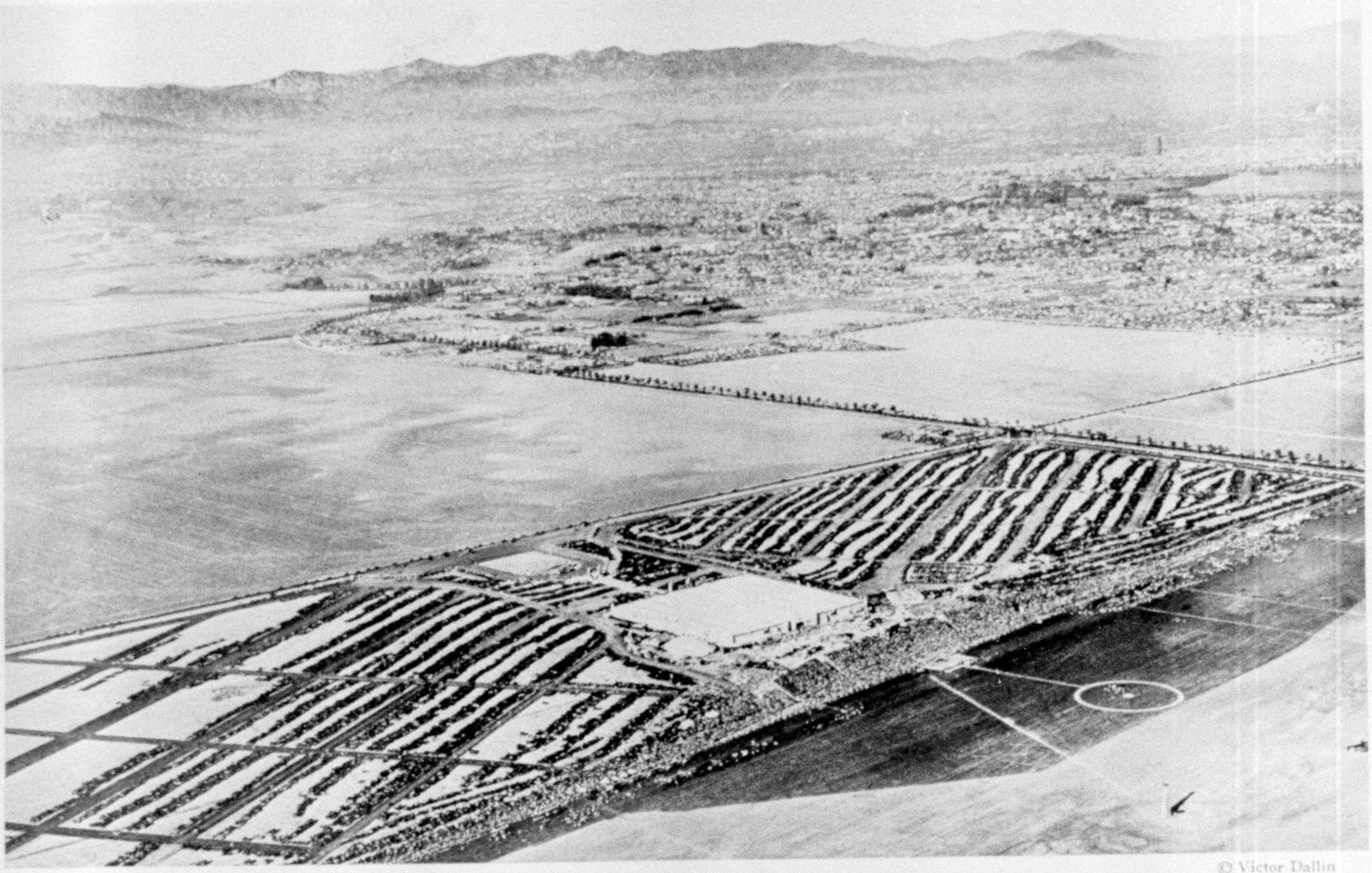
CONGRESS OF THE UNITED STATES

THESE AREAS WERE DEEDED TO THE UNITED STATES ON DECEMBER 30, 1916, FOR THE BENEFIT OF AND TO SERVE THE PEOPLE OF THE NATION.

Photograph from Giant Forest Studio

A TABLET COMMEMORATES ONE OF THE SOCIETY'S PUBLIC BENEFACTIONS

Members of the National Geographic Society take deep satisfaction in the fact that they have had a part in preserving for all time the superb Sequoias of the Giant Forest, mementoes of a past far beyond the records of written history (see "Our Big Trees Saved," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1917).



© Victor Dallin

LOS ANGELES POINTS WITH PRIDE TO THIS GREAT AIR FIELD

The black rows in the foreground are thousands of parked automobiles which have brought spectators from the city to see exhibitions of flying skill and daring. Note an airplane at the extreme left, from which the man with a parachute (center above row of trees) has just jumped.

BATHERS SPORT IN A SEA OF GOLD, AS THE SUN SETS ACROSS NEWPORT BAY, SOUTHERN CALIFORNIA traveled El Camino Real (The King's Highway) half the length of the State and brought a Christian model to a heathen land. He was the first great missionary, to whom California owes much and whose favorite resting spot this was. One poet sings of it:

Madre de Dios, keep for me
My dream of hill and sky and sea—
The green rays where my path was set,
The gay guitar and castanet,
And stars that hailed, at close of day,
The sunset roofs of Monterey.

Another famous mission in the series which the Franciscans built a day's journey (by horseback) apart is that of San Juan Capistrano, halfway between Los Angeles and San Diego (see Color Plates XIV, XXII, and XXIII).

SAN JUAN CAPISTRANO LINKS PAST AND PRESENT

One may wonder at the stately palms, whose fronds wave a hundred feet overhead, or walk "knee-deep in June" outside. Yet we must not leave San Juan Capistrano for the beauties of the lily ponds (see Color Plate XIII) or the wonders of San Diego's Balboa Park without listening for a moment to the story of this beloved mission, dedicated November 1, 1776, only a few months after the Liberty Bell proclaimed the new Republic from Philadelphia's Independence Hall, then almost in another world.

The mission was built by Indians, who quarried the red stone from adjacent hills and carried it down to the mission with infinite patience and labor. The building furnished indisputable proof of the high state of manual skill to which the red man was lifted by the tireless teaching of the Franciscan padres.

The church was destroyed by earthquake in 1812 and, barring one short-lived attempt, for more than a century it was permitted to crumble to pathetic decay. In recent years the mission has been restored as nearly as possible to its original state and it is now a shrine linking the present with the past, visited by hundreds of tourists every day, as they travel over a new King's Highway of concrete, which passes a few yards from the mission gates and connects the two major cities of southern California, Los Angeles and San Diego.

Though the wild flowers are more spectacular in their promiscuous scampering over the face of Nature, their life is comparatively short; cultivated flowers, on the other hand, favored by climate and soil, produce for twelve months a year a never-ending and varied profusion of beauty.

THE ROSE TOURNAMENT OF PASADENA

In the spring it is possible to drive for miles over petal-strewn highways, to become almost intoxicated with the perfume of the orchard blossoms and wild flowers, but all the year the observer in town or country is rarely out of touch with beautiful grounds which form a setting for residences, great and small. Often the surroundings far outshine the house in imposing upkeep, and few indeed are the homes which make no pretense at attractive exteriors.

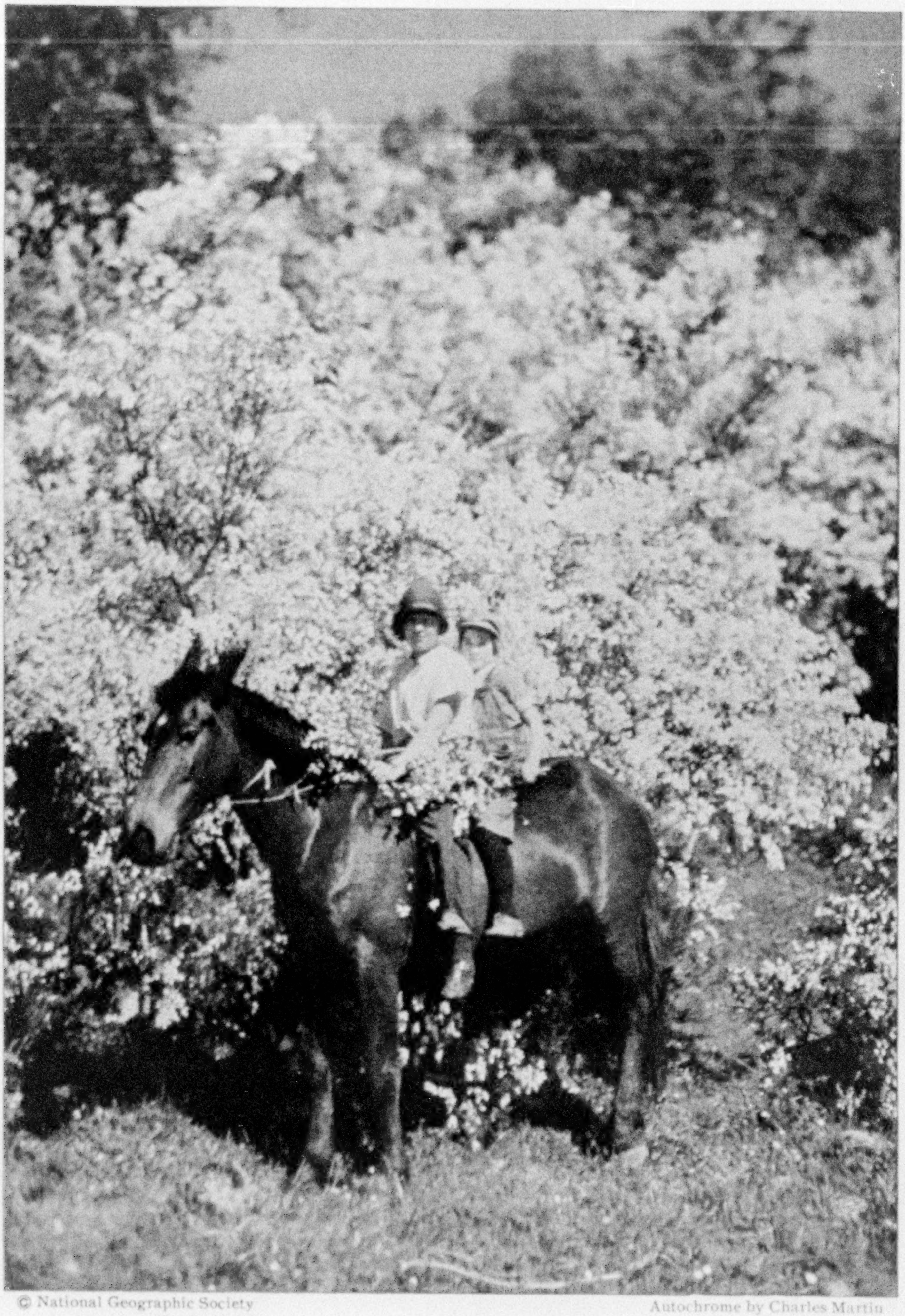
Some of the larger and more pretentious estates, where expert gardeners and landscape artists are employed, are more beautiful than public gardens and parks in many Eastern cities.

Once a year the flower consciousness of the people of California overflows into outward expression. The Rose Tournament, held on the first of January, in Pasadena, is the culmination of a community's desire to "tell the world." This gigantic fiesta is months in preparation. It involves an intricate organization in which every civic institution has a part. Almost every town in southern California and some in the north participate in it, and the tournament parade, when it swings into Colorado Street for the approval of visitors who have assembled from all parts of the world, is a spectacle of inspiring beauty. It is a pageant of blossoms. This year there were more than 300 entries, each a conception of great beauty.

A FLOWER FLOAT FOR THE FAIR LADY OF SHALOTT

As an example of the elaborateness of the plan, a description of the 1929 winning float may be of interest. The subject was Tennyson's "The Lady of Shalott."

By the island in the river
  Flowing down to Camelot.
Four gray walls, and four gray towers,
Overlook a space of flowers,
And the silent isle imbowers
  The Lady of Shalott.



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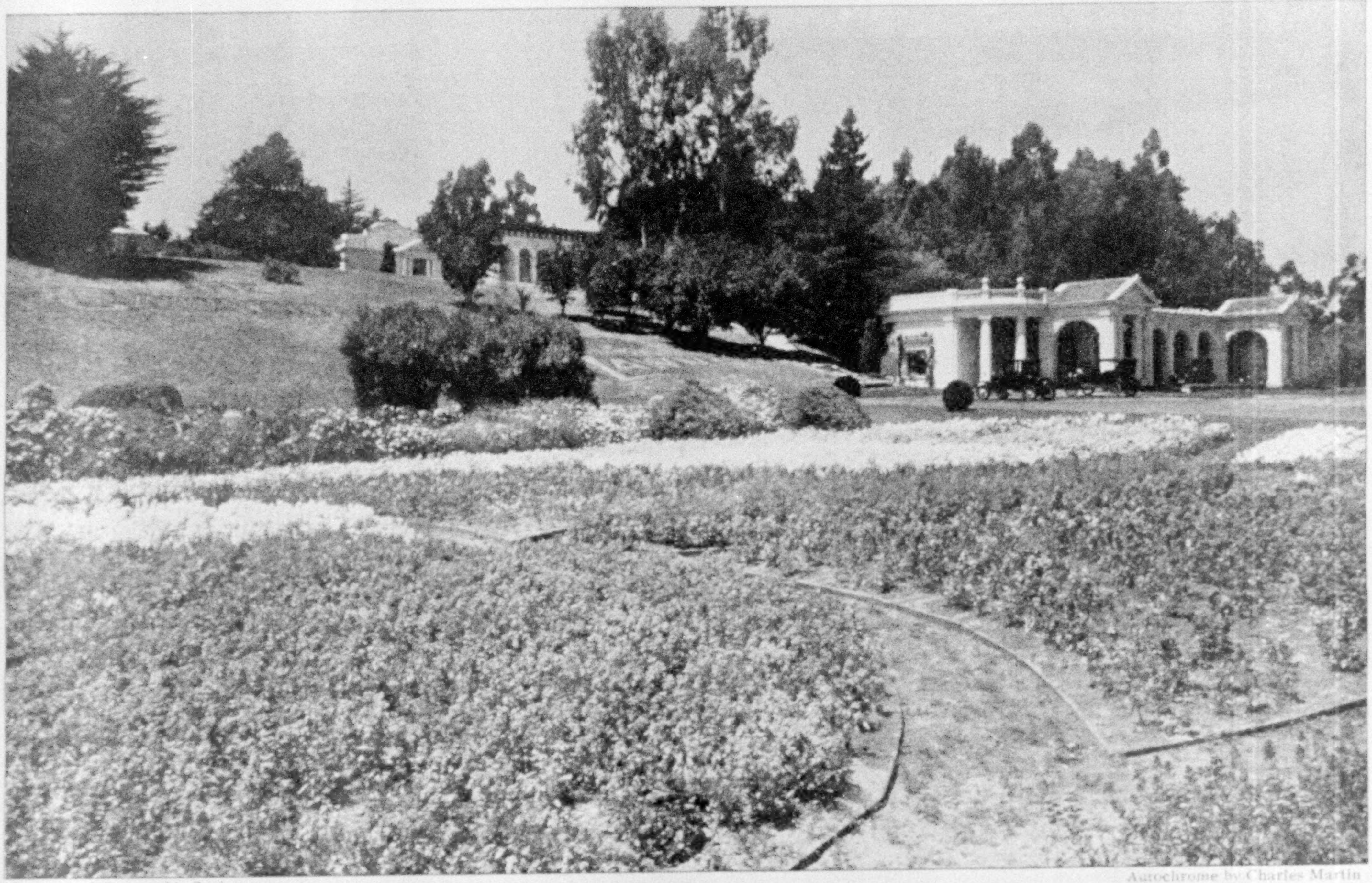
HILLSIDES NEAR CRESCENT CITY GLOW WITH SCOTCH BROOM

Although an importation from Europe, this hardy shrub thrives and spreads rapidly in the genial airs from the Pacific. One of the most prolific of bloomers, it covers whole mountain slopes with its blanket of golden splendor.



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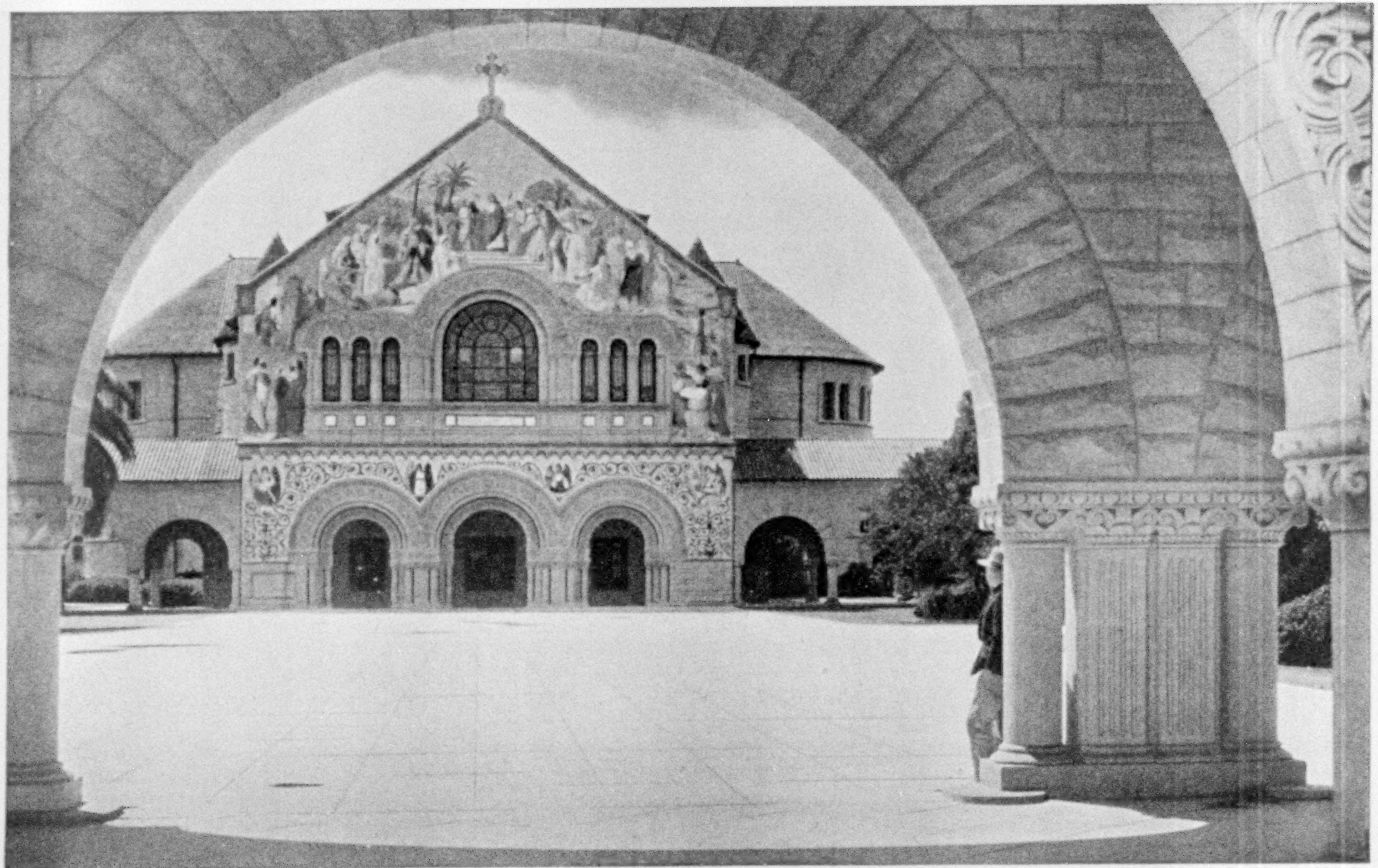
CYPRESS LAWN, FLOWERY THROUGHOUT THE YEAR, IS A LOVELY ORNAMENT OF SUBURBAN SAN FRANCISCO

Landscape gardening has advanced to a fine art in the City of the Golden Gate. Brilliant beds of bloom against the rich green of the turf lend color to even the most formal scenes.



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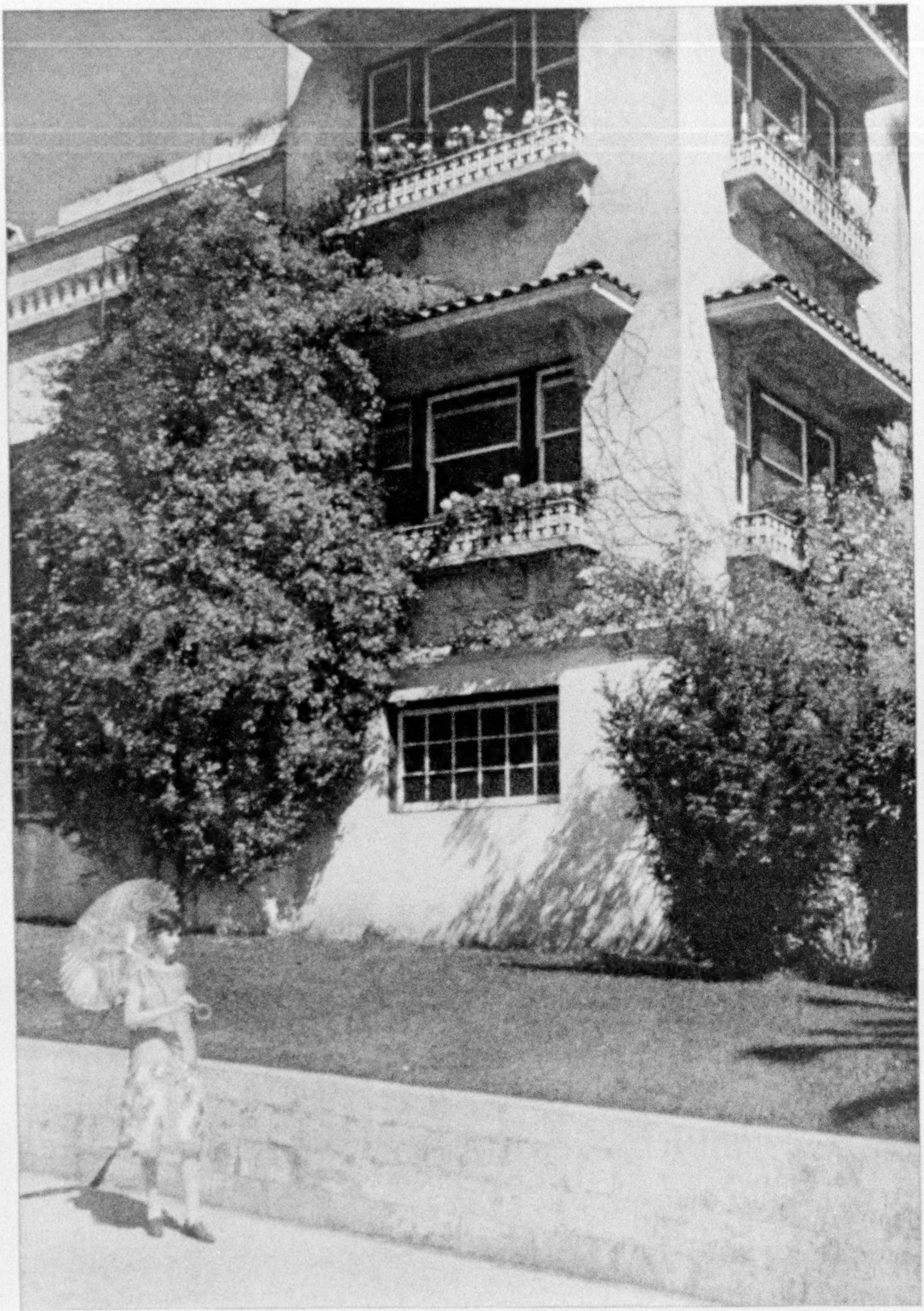
PRESIDENT HOOVER'S ALMA MATER, AT PALO ALTO, IS JUSTLY PROUD OF STANFORD MEMORIAL CHAPEL

The mosaics depicting the Sermon on the Mount are the work of Salvati, of Venice. This is the fourth set. The first was destroyed by the earthquake and fire, the second was lost in a Venetian factory bombed by an Austrian airship, and the third went to the bottom of the Atlantic when a submarine sank the vessel that carried it.



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BOUGAINVILLÆA VINES MAKE STRIKING WALL DECORATIONS

These semitropical climbers with their vivid blossoms lend exotic charm to many of the beautiful homes in Santa Cruz.

FIELDS OF FRAGRANCE SCENT THE COUNTRYSIDE

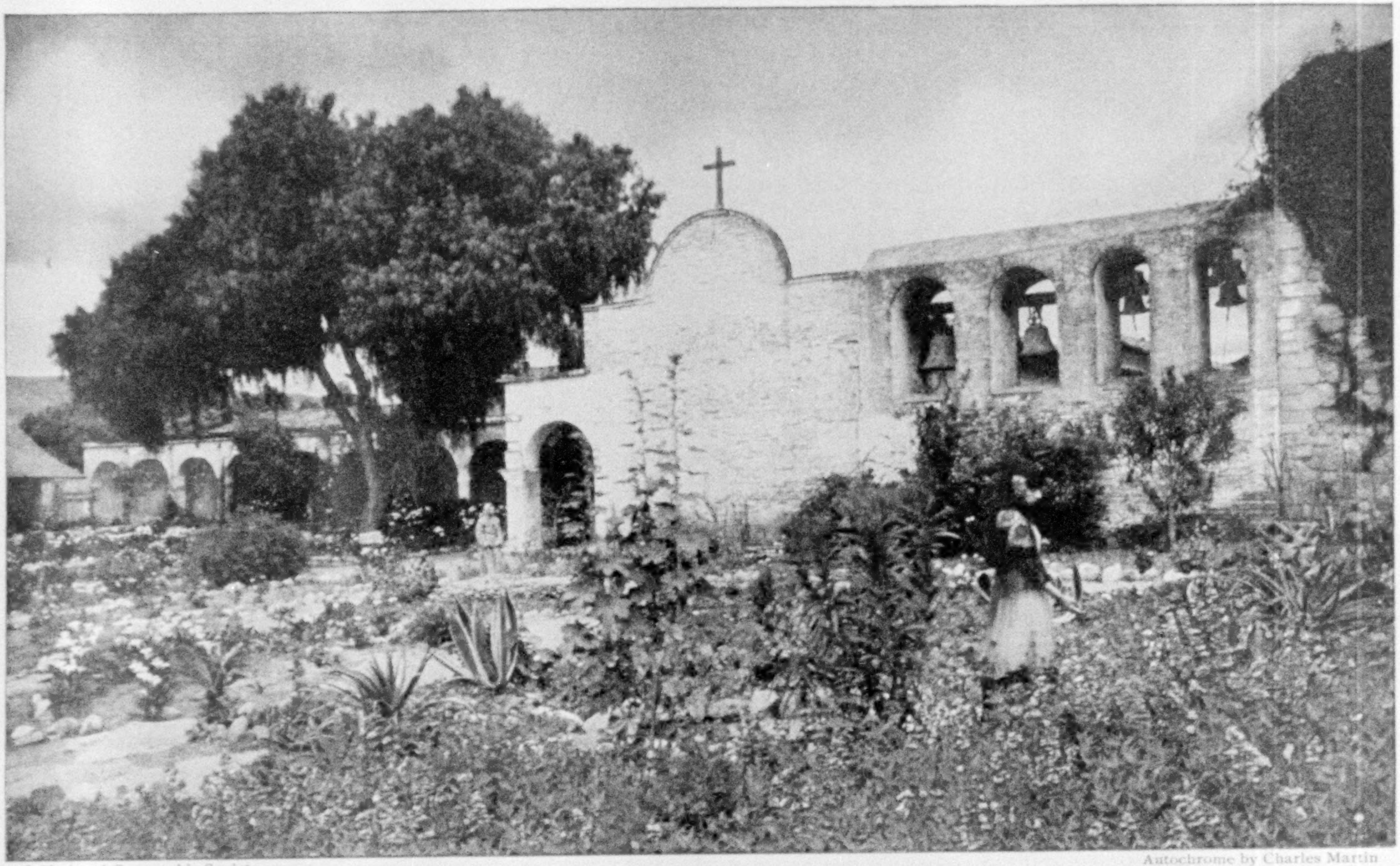
Acres of cultivated sweet peas, exhaling their delicious perfume into the wine-bright air, charm the senses of the leisurely stroller of the lanes of Santa Cruz.

© National Geographic Society

Autochromes by Charles Martin

IN SPRINGTIME THE DESERT BURSTS INTO BLOOM

Coreopsis with its gorgeous blossoms, many of them three inches across, literally carpets Antelope Valley, Los Angeles County, in April and May. These flower patches gleam for miles.



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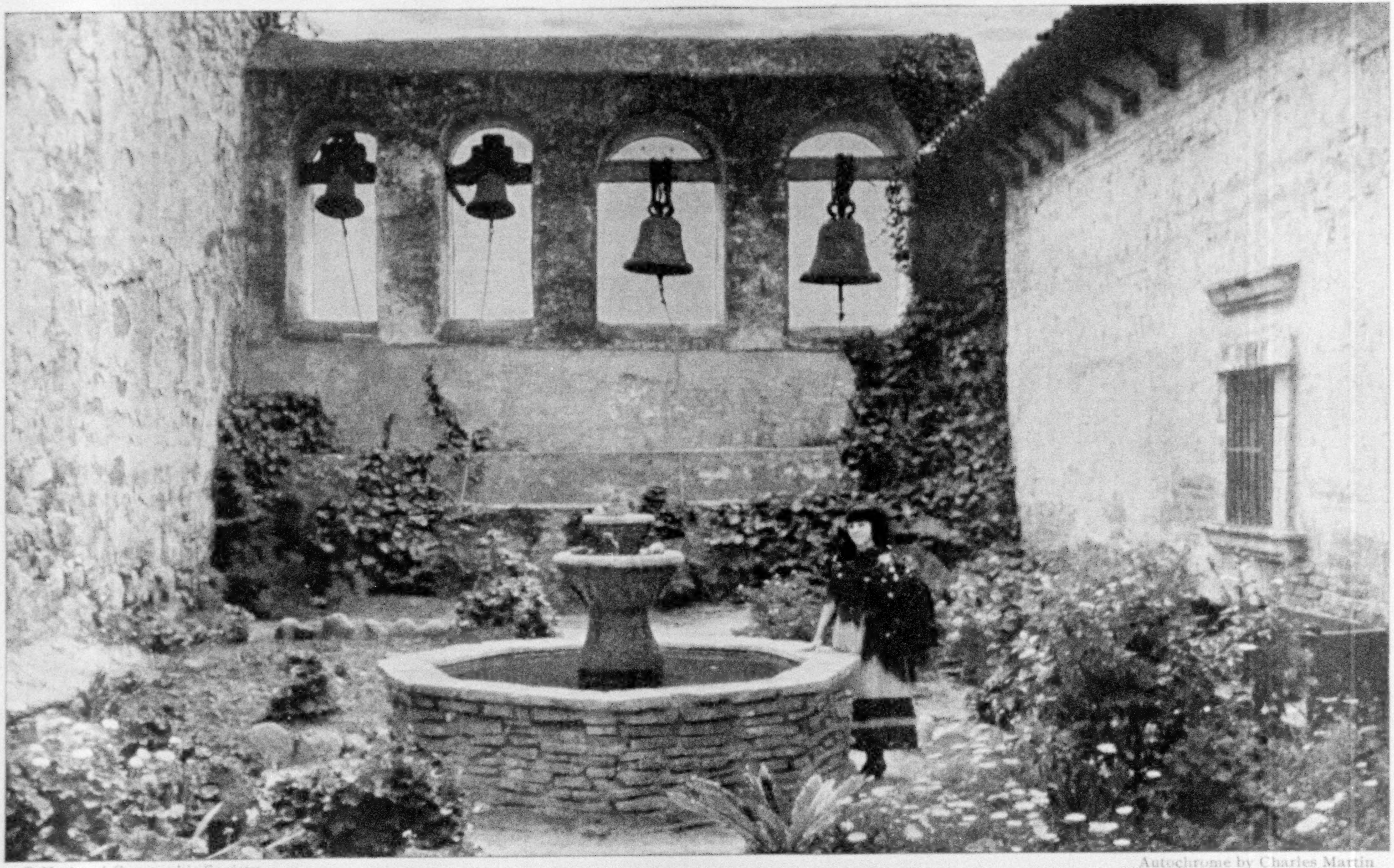
THE OLD MISSION OF SAN JUAN CAPISTRANO KNOWS AN AGE AS MELLOW AS ITS BELLS



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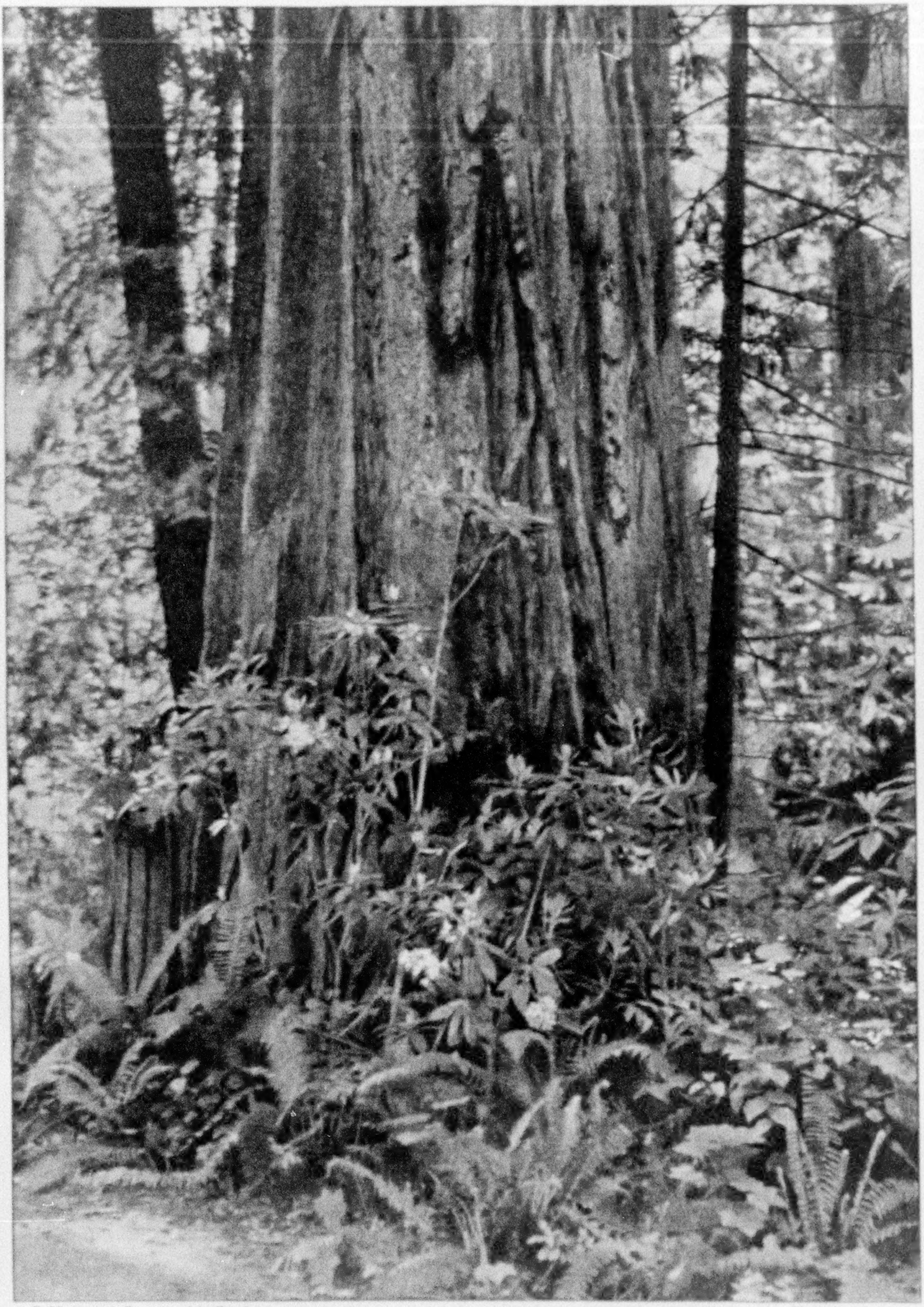
HERE DREAM "A FOUNTAIN AND A SHRINE, ALL WREATHED IN FAIRY FRUITS AND FLOWERS"



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AMONG COAST REDWOODS RHODODENDRONS BLOOM IN CARELESS PROFUSION

The forests near Crescent City are most alluring when these graceful wild shrubs put forth their delicate flowers.

The massive floral piece included towers and battlements of a castle, a stream meandering between banks lined with flowers blazing in color, and on its placid bosom a little bark drifting to Camelot, carrying the Lily Maid so beautiful in death.

> She floated down to Camelot.
> And as the boat-head wound along
> The willowy hills and fields among,
> They heard her singing her last song.

This floral piece was 56 feet long and 15 feet wide. It was entirely of flowers, with the exception of the Lady of Shalott, in her boat.

The castle, the towers of which were 15 feet high, was constructed of dusty-miller, maidenhair fern, and narcissus. The doors and windows were of violets, the moat bridge of Pernet roses, violets, and maidenhair ferns.

A blazing sunset behind the castle was beautifully worked out in cerise, orange, red, pink, lavender, and white sweet peas, yellow chrysanthemums and blue delphinium, babysbreath, and maidenhair fern. The island was of heather, fern asparagus, and maidenhair fern.

The river, one of the most gorgeous parts of the entire effect, was in pastel delphinium, babysbreath, and maidenhair fern. There was a generous sprinkling of waterlilies in the water around the castle.

The meadows at the sides of the stream were done in bluegrass, barley and rye, pink, yellow, and white roses, daisies, tulips, jonquils, anemones, ranunculus, and lilies-of-the-valley.

The boat which carried the Lady of Shalott was of deep-blue delphinium for a rim, fern asparagus, and salmon sweet peas for the sides.

A HORTICULTURAL PARADISE

Though roses predominated, chrysanthemums, carnations, marigolds, cornflowers, orange blossoms, heather, larkspur, daisies, sweet peas, pompons, Bougainvillæa, birch bark, narcissus, candytuft, Chinese lilies, gladiolus, magnolia leaves and blossoms, delphinium, violets, smilax, and scores of other flowers were used most effectively in carrying out the float designs based on poems, works of art, Mother Goose rhymes, and whatnot. In many of the sets, from 150,000 to 200,000 individual flowers were used.

Commercial flower culture in the Southwest is almost wholly a task of planting. The harvest is certain to come. Less than 10 miles from the heart of Los Angeles, several hundred acres are devoted to the cultivation of asters, zinnias, and blue laceflowers. They unfurl carpets of color at the very feet of snow-capped mountains. Then flower-laden motor argosies bring them to town to spread their beauty from the church altar in the tiniest temple to the halls of Terpsichore. It has been said that California is a "religion," and, if it is, flowers are its chief symbol.

In colder climes the hothouse is the incubator of the most beautiful flowers: California is in itself an incomparable producing center warmed by a central heating plant overhead. Here delicately nurtured agapanthus, alstrœmeria, billbergia, to mention only a few of the blue bloods known to the East and North, are hardy children at home where they rub shoulders without caste or special care.

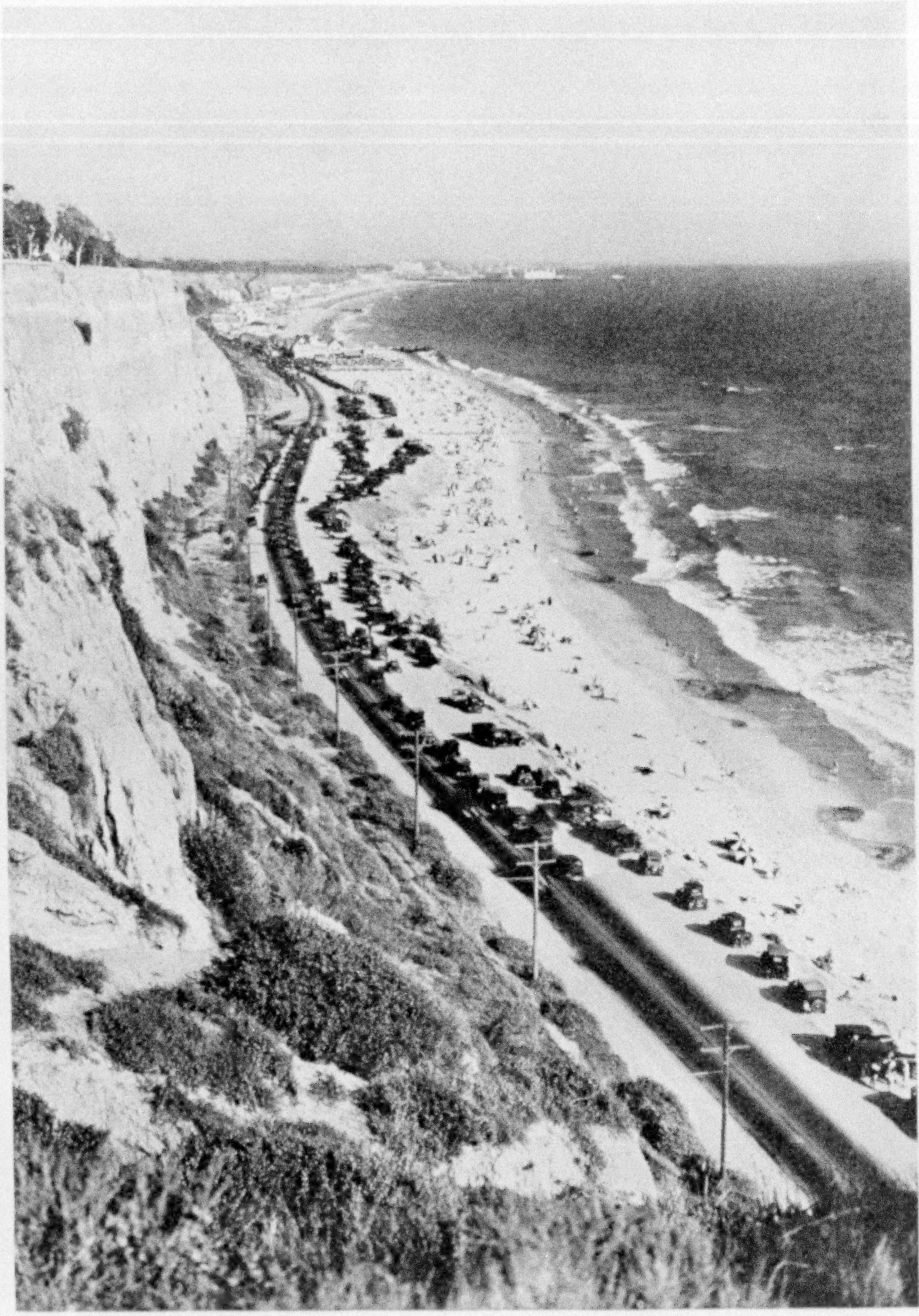
Pansies for thoughts—and for the garden-path borders. Wee ones or giants are the most popular of the bedding and border plants. The impetuous flower lover has a close-up of everything from lotus to verbena; for the trellis, honeysuckle, Bougainvillæa, ivy, double daisies, callas, agapanthus, and columbine.

Among the native ferns there is plenty of choice. The woodfern, with its delicate, feathery foliage of light green; the brake, with its heavy frond colored dark green with a bronze reverse.

Among so many high-caste strangers from afar the little native flowers play no second fiddle. They are free-flowering, hardy, and require a minimum of care after their establishment in the garden: iris, reaching its petaled beauty to a height of 10 to 20 inches; yerba buena, a tiny trailing plant with a precious fragrance; primroses of many varieties, the yellow evening-primrose topping many of its companions, with a height of six feet or more, and wearing upon its bushy breast large yellow flowers in great abundance.

MANY CALIFORNIA WILD FLOWERS EMBRACE CIVILIZATION

Many California wild flowers may be successfully tempted to embrace civilization and bloom in private gardens. One of the most easily tamed is the black-eyed



AT SANTA MONICA THE COAST HIGHWAY RUNS BETWEEN PALISADES AND BEACH

This attractive residence city near Los Angeles is noted for its superb beach. The fine paved highway connects San Diego in the south with San Francisco, 570 miles to the north. Atop the 150-foot palisades a beautiful park and boulevard extend.

SPRINGTIME DECKS THE PRUNE TREES OF THE GOLDEN STATE WITH GARLANDS OF SNOWY BLOSSOMS

In addition to producing a majority of all the prunes grown in this country, California ranks first among the States in the production of grapes, peaches, pears, apricots, oranges, lemons, cherries, dried figs, olives, walnuts, and almonds. Almost any kind of fruit or vegetable can be grown within its borders and its golden sunshine has proved far more of an El Dorado than its ore-bearing rocks and streams. A prune is a variety of plum which dries sweet without removing the pit.

susan—a flower adrift through the meadows of the Sierra Nevada that will grow in great profusion in captivity. Its large, yellow, daisy-shaped cup holds a very soft, black eye. Then there are western goldenrods, wild hollyhocks, meadowrue, and always, of course, the truant of the hills, the California-poppy.

Following is a partial list of trees and shrubbery not native to California, but well adapted to realize the largest results from climatic conditions and grown on a considerable scale for their beauty and decorative charm: acacia, a strikingly beautiful tree reaching a height of 30 feet, silvery gray in foliage, with flowers of yellow in profusion; the arbutus (the strawberry-tree), Natal palm, camphor-

Photograph by International

BRUIN JR. LOOKS BEFORE HE LEAPS

Frightened, the little bear went to the water's edge prepared to dive. Contemplation of the great Yosemite waterfall must have dulled his ardor for a plunge, for he soon turned about and made friends with the photographer.

tree, carob, eucalyptus, eugenia, myrtle, and tea-tree.

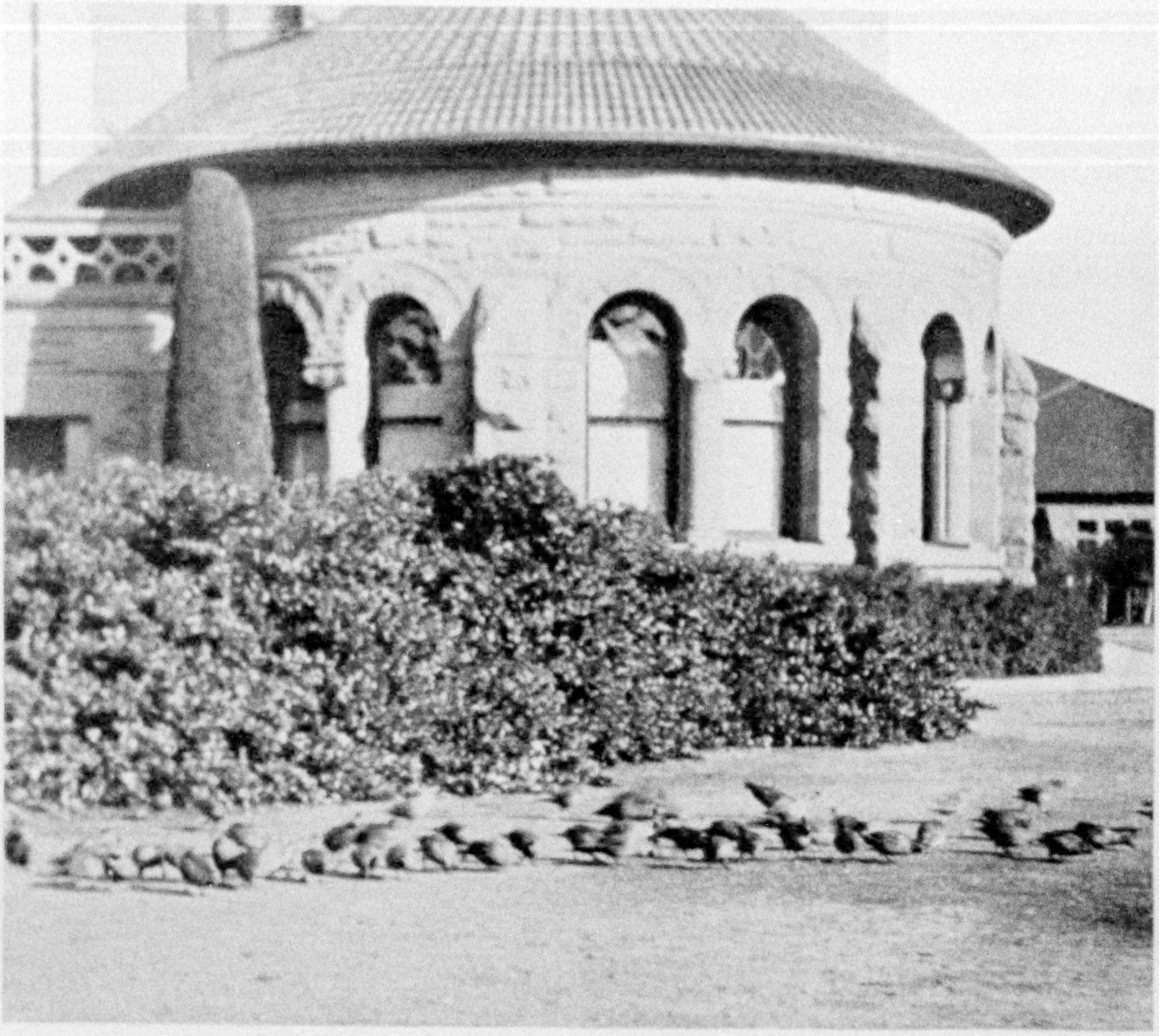
For roses, the climbing Lady Hillingdon is a vine of charm, burying arbors and gables beneath a mass of blooms. The Cherokee is a climbing rose of rare beauty, a princess of the royal household. With its bright, shining green foliage, it presents a magnificent sight when in full bloom. The Cécile Brunner, climbing Mme. Caroline Testout, and Paul's scarlet climber—all of these and more will grow in the yard and garden spot with little care and much beauty.

Not all roses climb to their gabled thrones. Many varieties "stay put." For beautiful white blooming roses of this type there are the Frau Karl Druschki, as white as snow, free-flowering and handsome; the Kaiserin Auguste Viktoria is another. For shades of red and scarlet, there are among the hybrid tea roses: Hadley, with its deep velvety crimson petals; Padre, with its intense coppery scarlet; the copper and coral Louise Catherine Breslau, and La France, the bright satiny pink with silver reflex.

Castilian beauties in the old Spanish days of California always wore a tantalizing red rose in their hair while they danced to the provocative castanets.

Flowers, like people, journey from the farthest ends of the world to be touched by California's sunshine — little strangers who soon find themselves "at home" in this floral Eden. Bulbs of rare beauty and worth come from the seven seas and all the shores thereon to shed their loveliness in a new world. Hyacinth, gladiolus, and narcissus, in the embrace of California's earth, have become "home folks."

In recent years the cultivation of narcissus bulbs in the United States has increased rapidly, especially in California. A few years ago it was discovered that



Photograph courtesy of Dr. Ray Lyman Wilbur

A COVEY OF CALIFORNIA VALLEY QUAIL FEEDING ON THE CAMPUS AT THE REAR OF THE STANFORD MEMORIAL CHURCH (SEE COLOR PLATE XIX)

The valley quail is on good terms with civilization, and when given sanctuary, as here, it flourishes and multiplies on cultivated tracts, especially gardens and vineyards, even on the outskirts of populous towns.

imported narcissus bulbs were arriving in this country badly infested with the larvæ of two bulb flies which are very destructive to bulbs, and have also been known to attack onions, potatoes, and the rhizomes of iris or fleur-de-lis. So now all members of the narcissus family grown in other countries must, like disqualified immigrants, forego the pleasures of the New World until such time as they can be made desirable; but the ones that have been grown here for years, and also the new immigrants, when properly safeguarded, bloom in profusion in this floral meeting ground of the nations.

The ravishing of hundreds of thousands of acres of wild flowers in the spring months by motorists who drive afield and return with their cars laden with blossoms which soon wither and die became such a serious menace that stringent protective ordinances have been passed by most of the southern counties of California, making it illegal, under severe penalties, to pluck or harm the desert and mountain wild flora. Christmasberry (also known as California holly) is protected by a State law.

Other species locally in the forbidden list include: desert-holly, smoketree, desert-lily, Spanish-bayonet, Joshua tree, Spanish-dagger, chaparral yucca (also called Quixote plant), yucca, indigobush, lemon lily, mountain dogwood, western azalea, tiger lily, agave, desert ironwood, ocotillo, maidenhair fern, swordfern and all species of cacti, snow plant, California Washington palm, cholla, mariposa, Matilija-poppy, scarlet larkspur, Judas-tree, leatherwood, and wild quince.

Wild-flower conservation is assuming national proportions and observance of wild-flower day is now being promoted throughout the United States. This year it was observed on April 24 and thousands of school children participated in exercises having an educational trend and emphasizing the importance of conserving the growth and development of the wild flowers, not only in California, where they have so distinctive a value, but generally throughout the country.

MR. COOLIDGE BECOMES A MEMBER OF THE SOCIETY'S BOARD OF TRUSTEES

MEMBERS of the National Geographic Society will learn with pride and pleasure that their Board of Trustees has been strengthened by the election of Hon. Calvin Coolidge, former President of the United States, to its membership at the Board meeting on May 1.

Mr. Coolidge in a letter to Dr. Gilbert Grosvenor, President of The Society, had previously expressed his willingness to serve The Society on its Board.

Members of the Board are elected for life. They give their services without remuneration to promote the objects of The Society, the increase and diffusion of geographic knowledge.

Mr. Coolidge's interest in the work of the National Geographic Society dates from the time he was Vice-President of the United States, when he lectured before The Society and wrote an article for its NATIONAL GEOGRAPHIC MAGAZINE on "Massachusetts and Its Position in the Life of the Nation" (April, 1923).

While he was President Mr. Coolidge appeared before the members of The Society in Washington upon several notable occasions. In behalf of The Society he presented to Commander Richard E. Byrd the Hubbard Gold Medal in recognition of Commander Byrd's flight over the North Pole. Previously he personally had approved the plans of the expedition under the joint auspices of the National Geographic Society and the Navy Department, when Commander Byrd took three Navy planes north for flights over Ellesmere Island and obtained his first far-northern flying experience.

When the Hubbard Medal was bestowed upon Col. Charles A. Lindbergh for his transatlantic flight, President Coolidge again was invited to make the presentation in behalf of The Society, and did so (see the NATIONAL GEOGRAPHIC MAGAZINE for January, 1928).

Because of Mr. Coolidge's great interest in and assistance to education and to every branch of research and exploration, his presence and counsel on the Board of Trustees will delight and encourage every one connected with the work of the National Geographic Society.

The National Geographic Society is the largest scientific and educational body in the world. Its 1,200,000 members are to be found in every country, colony, and mandated territory having a postal system.

More than 1,000 men and women, including graduates of 35 universities here and abroad, are employed in the preparation and printing of The Society's magazine, maps, school bulletins and other publications, and in the conduct of The Society's extensive research work and correspondence.

The full personnel of the Board of Trustees of The Society appears each month on the inside cover of the NATIONAL GEOGRAPHIC MAGAZINE.

ON THE WINGS OF THE WIND

In Motorless Planes, Pilots Ride in Flying-Fox Fashion, Cruising on Upward Air Streams and Lifted by the Suction of Moving Clouds

By Howard Siepen

IN GERMANY to-day hundreds of schoolboys are flying. Three thousand took official instruction in 1928. Elevators, control sticks, sideslips, take-offs, landings, and views "down below" are discussed now as freely and intimately as tennis or automobiles.

In the plane of the German boy *there is no engine*, it is true; yet he actually flies. And, from the very nature of his birdlike machine, he really learns more of air conditions than many a pilot of standard aircraft has yet learned; for, on the very first day, after intensive lecturing, he climbs into the seat of the glider, takes hold of the controls, and slips off into space.

In concentration, in quick thought and action, lies the boy's salvation, for no instructor flies with him.

Any schoolboy of fourteen years or over may enroll. Instruction is free and given by school-teachers themselves. This plan reassures parents, though primary gliding is not particularly dangerous, as the machines seldom fly higher than 10 or 12 feet. Later, with more experience, flyers may glide for 30 or 40 miles, attain an elevation of several hundred feet, and remain aloft for hours.

Nor is this new air art by any means confined to practice among boys. At the technical universities students have formed clubs for the study, design, and construction of their own motorless airplanes. Most of the highly sensitive, so-called "sail planes" have been developed at the universities.

Man's dream of flying on outstretched wings is as old as man himself, and for twenty years his planes and dirigibles, propelled by gas engines, have carried him over the earth.

But now, in this new glider device, with no artificial power at all, he may also cross mountains and valleys, cruise down rivers and far out to sea, hang on to a cloud and ride it for hours, or even remain almost motionless in air, like a hawk ready to swoop.

To understand fully the rise and amazing growth of Germany's gliding machines, one must look back—back to the pioneer makers of airplanes. The Wright Brothers, for example, and Lilienthal made their first aërial dashes in gliders. Then grew the idea of applying an engine with propeller to drive the glider.

Whence came, in time, the powerful, glittering machines of to-day.

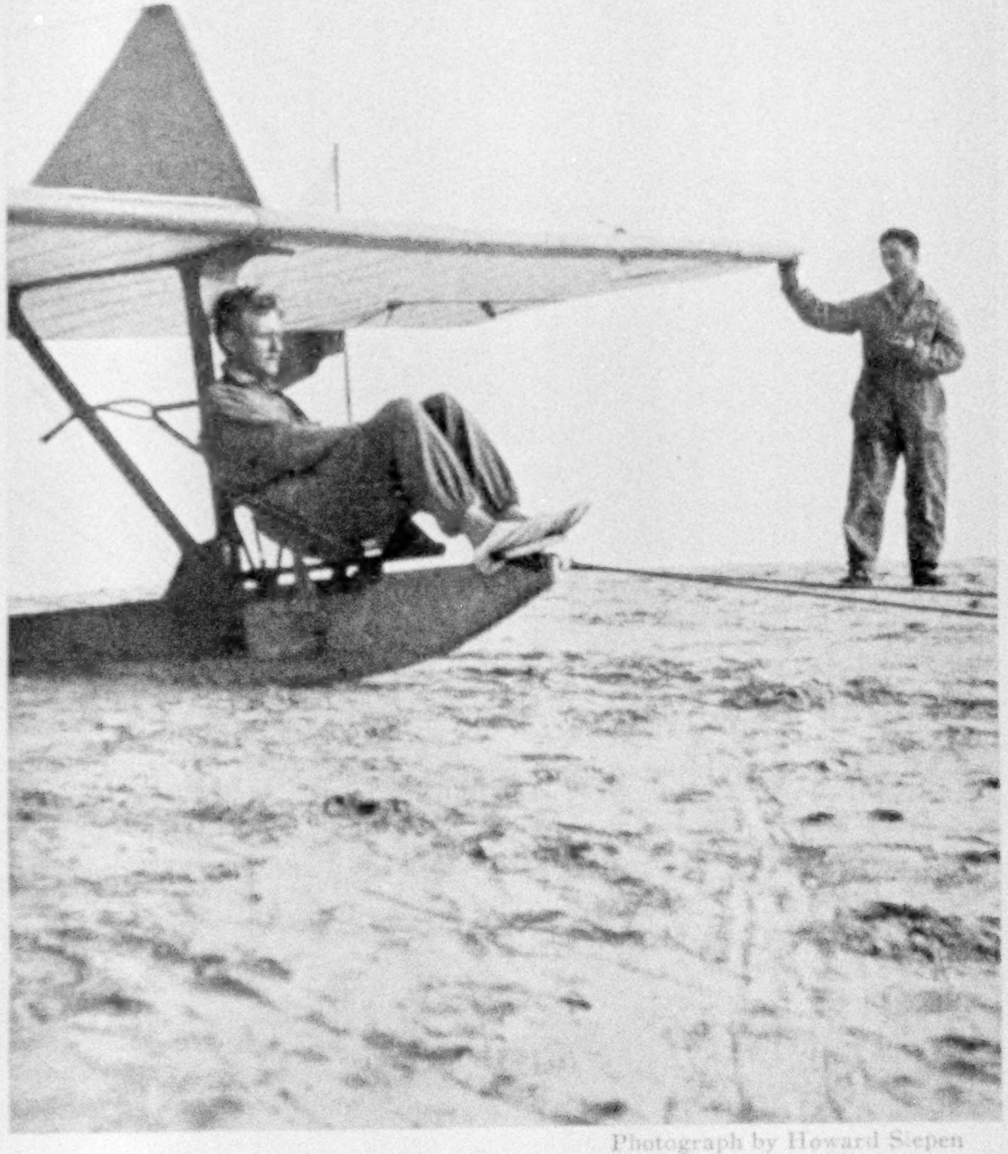
But they do not really *fly*, as birds soar; nor does the man in a plane *fly*, any more than a man in a boat swims.

GLIDERS LEAD TO A STUDY OF THE AIR OCEAN

So successful have motor-driven aircraft become, however, that the world's attention has been largely diverted from air travel by simple gliders. For nearly two decades only a few enthusiasts kept the art alive; but to-day, due to amazing increase in air commerce, man is more interested than ever in the air as an element—in that soft, light, flexible medium through which his flying ships must sail. So now the vast overhead aërial ocean, its whims and its peculiarities, afford a new and fascinating subject of study.

Already, from more recent adventures in gliding machines, it appears that man is coming to share what birds have always known about the air. He finds it will support him, as water carries a swimmer, if he will but handle his glider wings as soaring birds handle theirs. Even wind gusts, squalls, and clouds, which pioneer experimenters with gliders used to dread, are now recognized as useful aids to motorless flying craft.

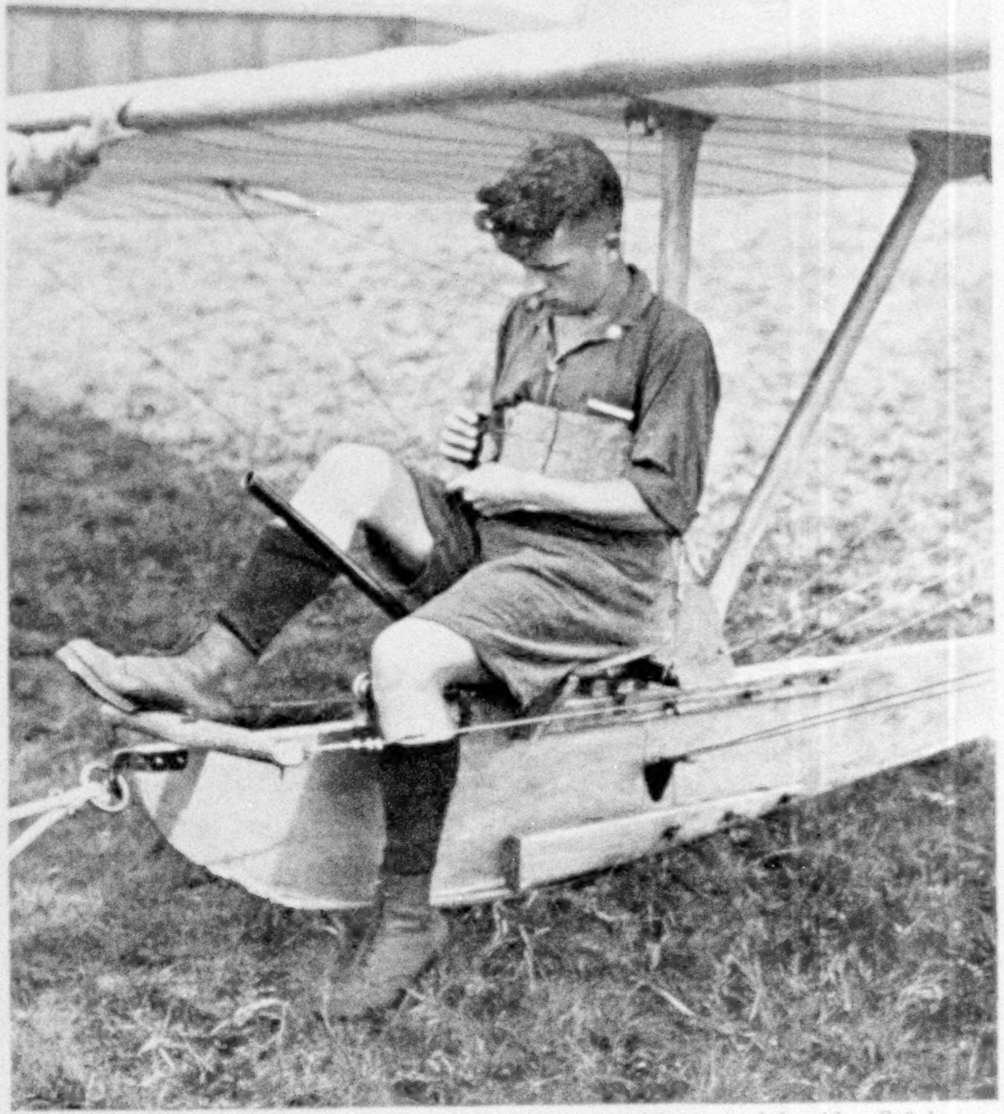
How birds use air currents and what flyers learned from them is revealed in an odd experience related by Major von Tschudi, a German aëronaut. Cruising one day in a balloon, he saw, far below



Photograph by Howard Siepen

BEFORE THE TAKE-OFF

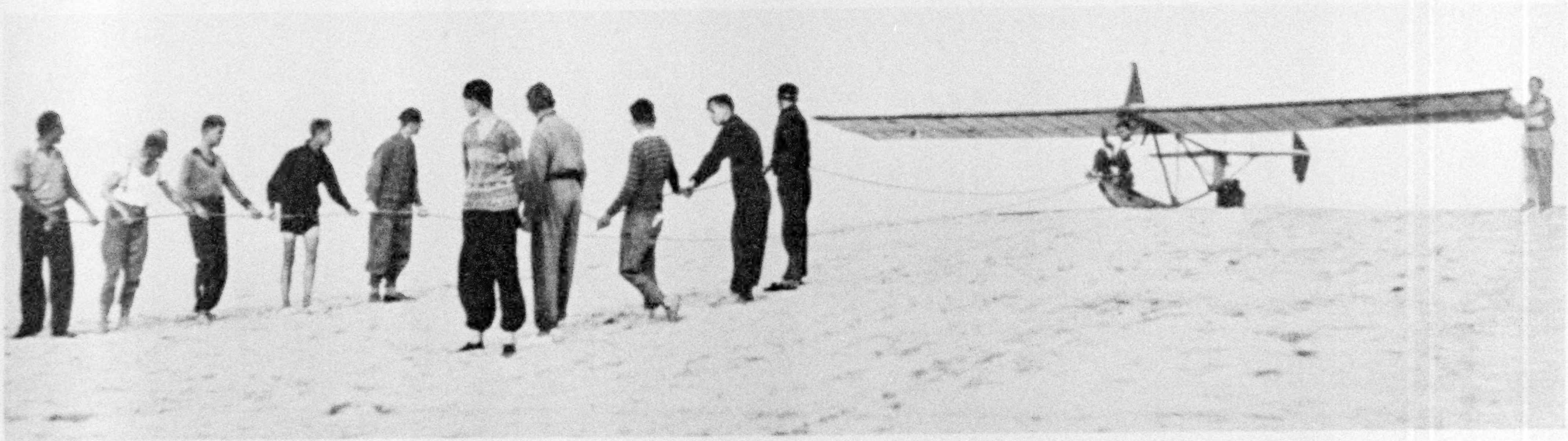
The instructor first directs his pupil to get all controls into a normal position. In his initial short practice flights, the student is required to choose a landmark or conspicuous object directly in front of the plane and several hundred yards away. On this mark he must keep his eyes fixed during his flight. In this way, and not by looking at the ground, which may be uneven, he can determine whether he is rising or falling. The bended knees will enable the young flyer to shoot out of his seat if he crashes to the ground.



Photograph by Alex Stöcker

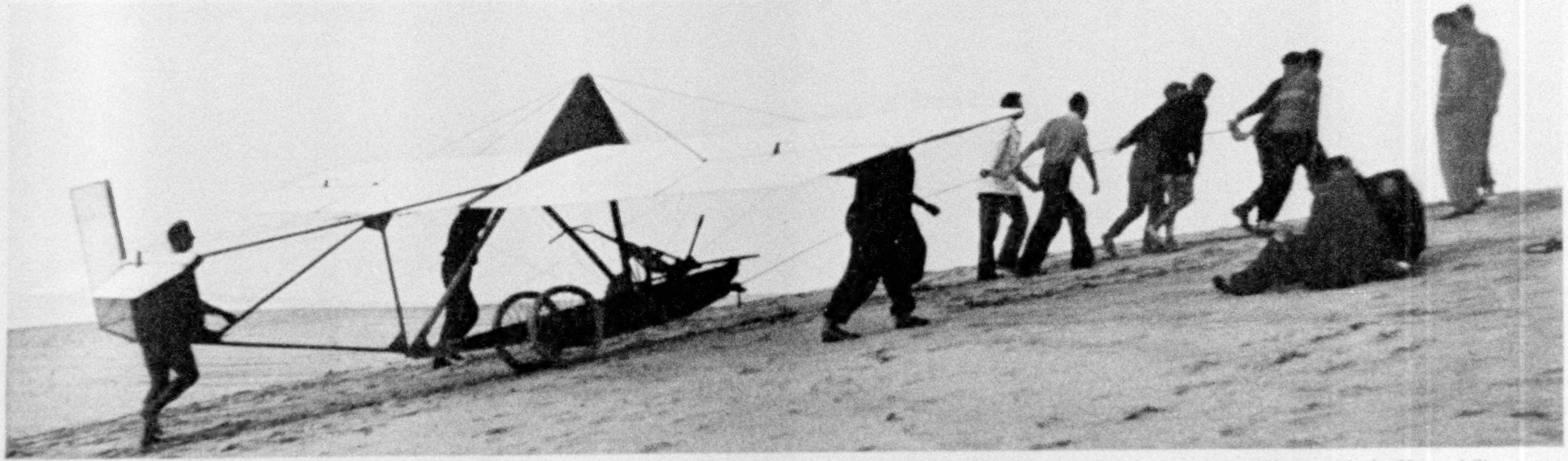
BUCKLING HIMSELF IN FOR HIS FIRST LESSON

This is the "cockpit" of the pupil glider. Sitting in this unprotected position, if the student falls out he is not hurt by splintering wood. Here, too, he can feel the wind and thus judge the speed of the machine. The controls are similar to those in an engine plane. The forward movement of the stick controls the elevator, and a sidewise movement operates the ailerons. A crossbar operated by the feet controls the rudder. The attachment of the starting rope is plainly visible. With the control stick in the position shown here, the machine would nosedive.



BY MEANS OF LONG, ELASTIC ROPES THE GLIDERS ARE SNAPPED INTO THE AIR

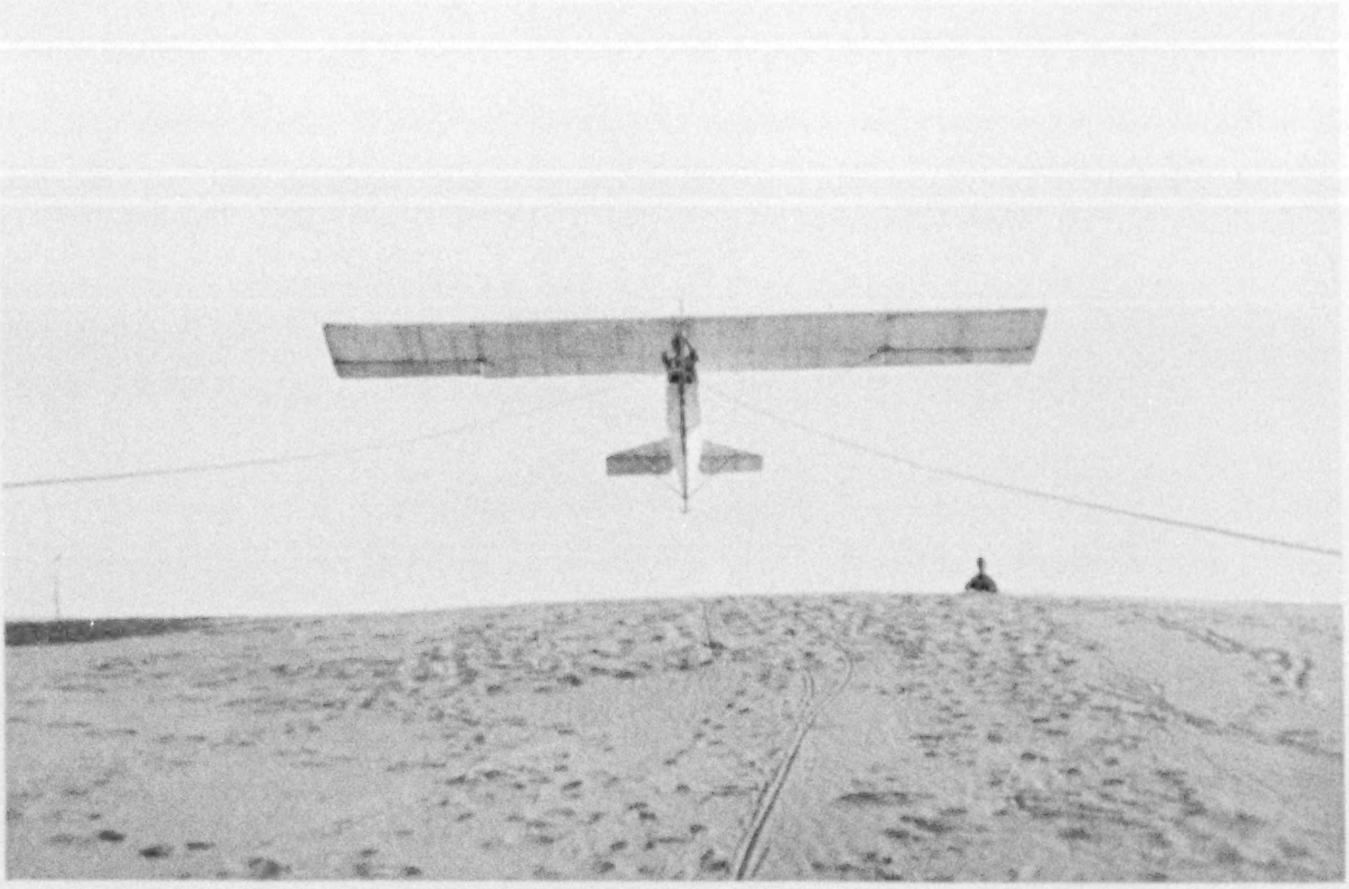
The pupil takes his seat and pulls back his stick, so that his elevator is set to rise. The instructor (at the right) holds the ship on an even keel and gives the starting orders: "Attention! Draw out! Run! Let go!" When he says "Draw out," the two starting groups walk ahead, gradually drawing out the rubber rope. At the order "Run," they run. The order "Let go" is addressed to the men holding the tail. The plane is suddenly released and it snaps up into the air.



Photographs by Howard Siepen

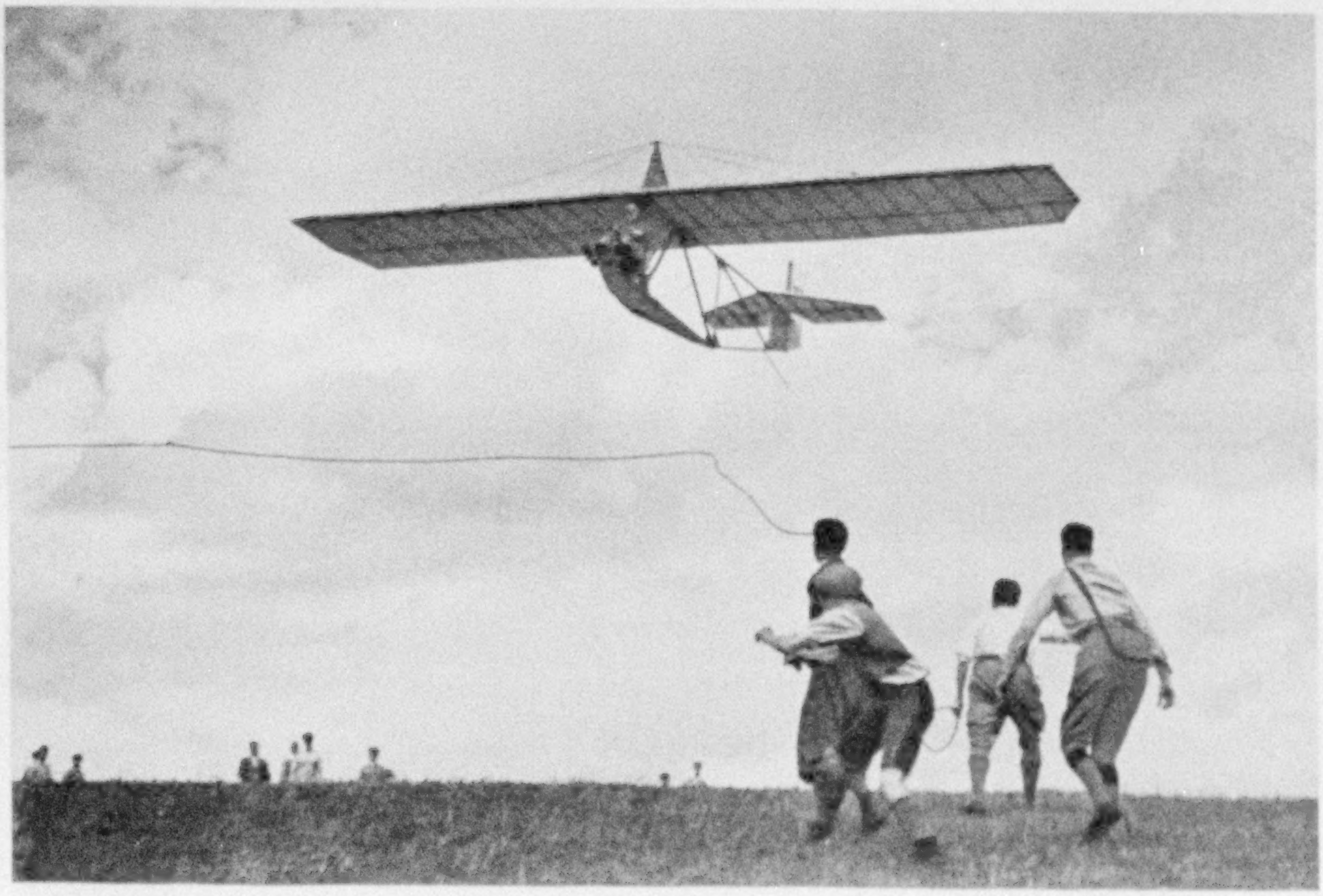
STUDENTS HAUL A GLIDER UP TO A FAVORABLE TAKE-OFF PLACE

The wheels are not landing gear; they are merely part of a small truck or carriage used in moving the glider. At the top of the dune, on the right, stands the instructor, with the pupil who is to make the next flight.



Photograph by Robert Kronfeld

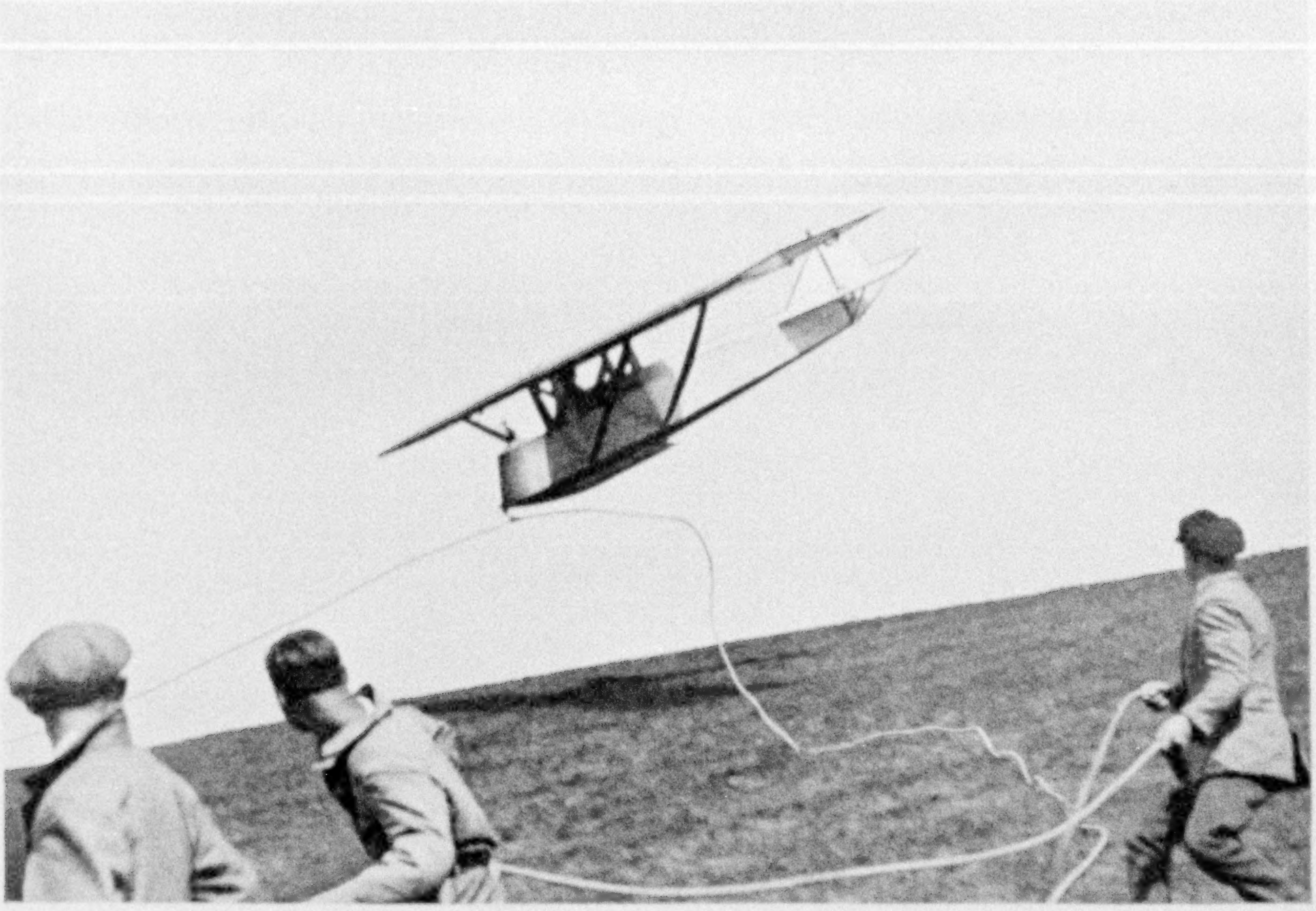
AS A GLIDER SNAPS INTO THE AIR, MEN PULLING THE STARTER-ROPE DUCK TO EACH SIDE TO ESCAPE POSSIBLE INJURY SHOULD THE TAKE-OFF BE CLUMSY



Photograph by Alex Stöcker

SNAPPED FORWARD BY THE ELASTIC ROPE, THE PLANE WHIZZES INTO THE AIR

The pilot must keep the nose of his plane down until he reaches the ground. By the singing of the air in the cables he can ascertain the position of his machine, for the more he nosedives the faster it will fly and the higher the note of singing. Starts that go straight up into the air may look very racy, but are extremely dangerous, because the plane is liable to slip backward.



Photograph by Alex Stöcker

FAILURE OF THE STARTING ROPE TO DETACH ITSELF PROMPTLY MAY SPOIL A TAKE-OFF

Here the rope has stuck, pulling the glider to earth again. The pilot is seen using his elevator, seeking to nose his craft upward. In most predicaments like this, the rope eventually falls free and lets the plane ascend.

him and off to one side, a flock of storks soaring along. Suddenly, to his amazement, they rose almost vertically, without so much as a flap of a wing. Soon they passed the elevation at which his balloon was flying and went on up, far above him. While he was still wondering at this marvel, his balloon, which had been traveling horizontally, reached a point about over that from which the storks had started upward. Then the balloon, too, began to rise rapidly, as if by magic force. . . . "I know now, after what gliding has taught us," said this airman, "that I had simply struck one of those vertical air currents, the same current on which the lazy storks were taking a free ride up to a higher altitude."

Robert Kronfeld, a German ace of the motorless flying machine, told me he has observed young birds, learning to fly, taking advantage of these same upward currents, which, as every gliding pilot knows, are his chief natural allies in flight.

The "feel of the air" and mastery of those currents that actually lift him are two of the modern gliderman's chief contributions to the science of air navigation.

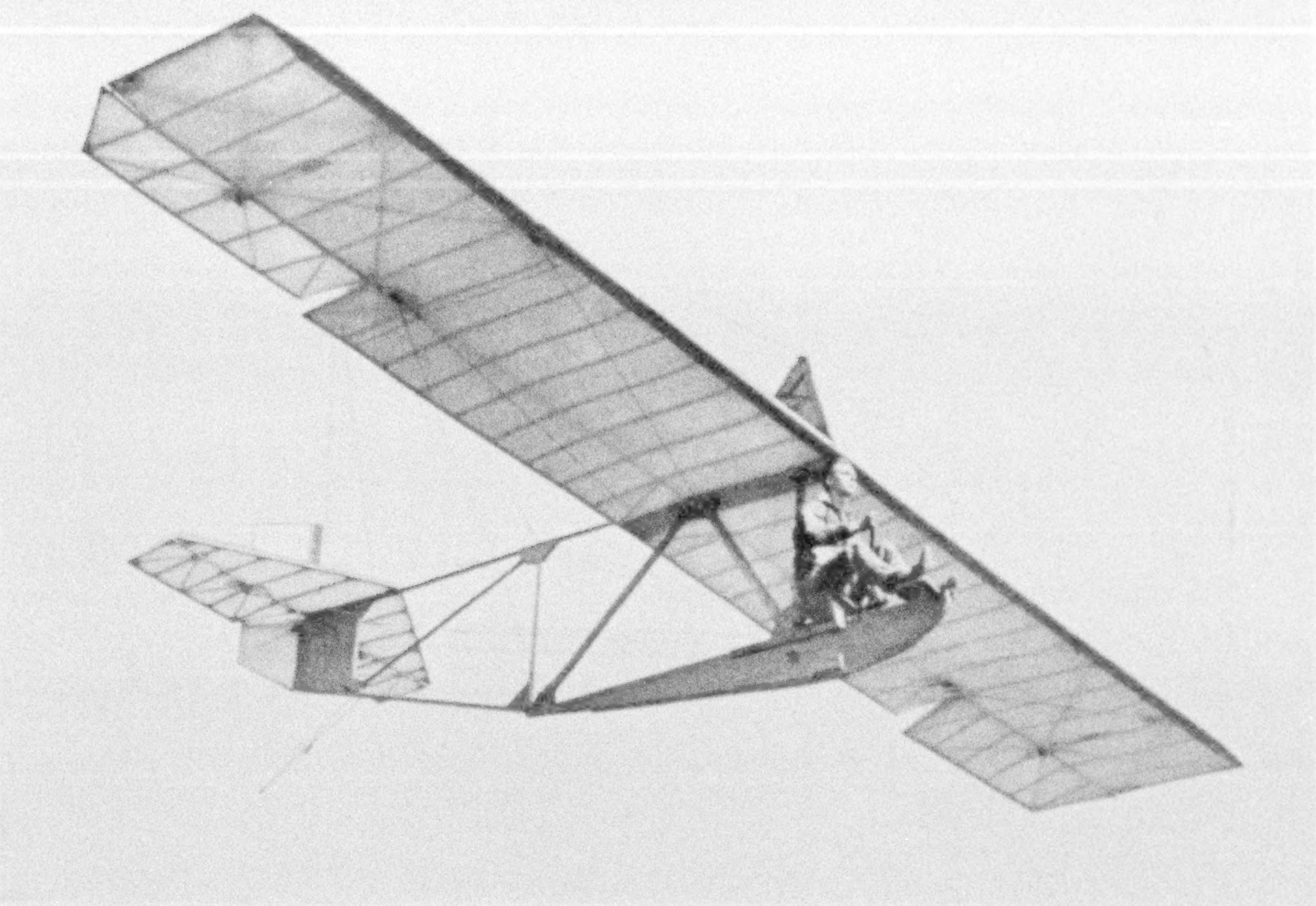
In Germany to-day some 200 glider clubs exist, and in 1928 about 10,000 flights and short glides were made. At the autumn "motorless airplane" competition in the Rhön Mountains, central Germany, 105 machines participated.

A SHARP DISTINCTION BETWEEN GLIDING AND SAIL FLYING

Between gliding and what they call "sail flying" the Germans make a sharp distinction. During a glide the plane steadily loses altitude till it lands. A "sail flight," on the contrary, is one in which the machine, while pointing downward, is lifted by upward air currents, and thus either maintains or increases its elevation.

For training a beginner in motorless flying, the simple glider is used; but it is the sail plane which actually *flies*. In build it is more sensitive than a simple glider and capable of responding to vertical air currents (see pages 760 and 761).

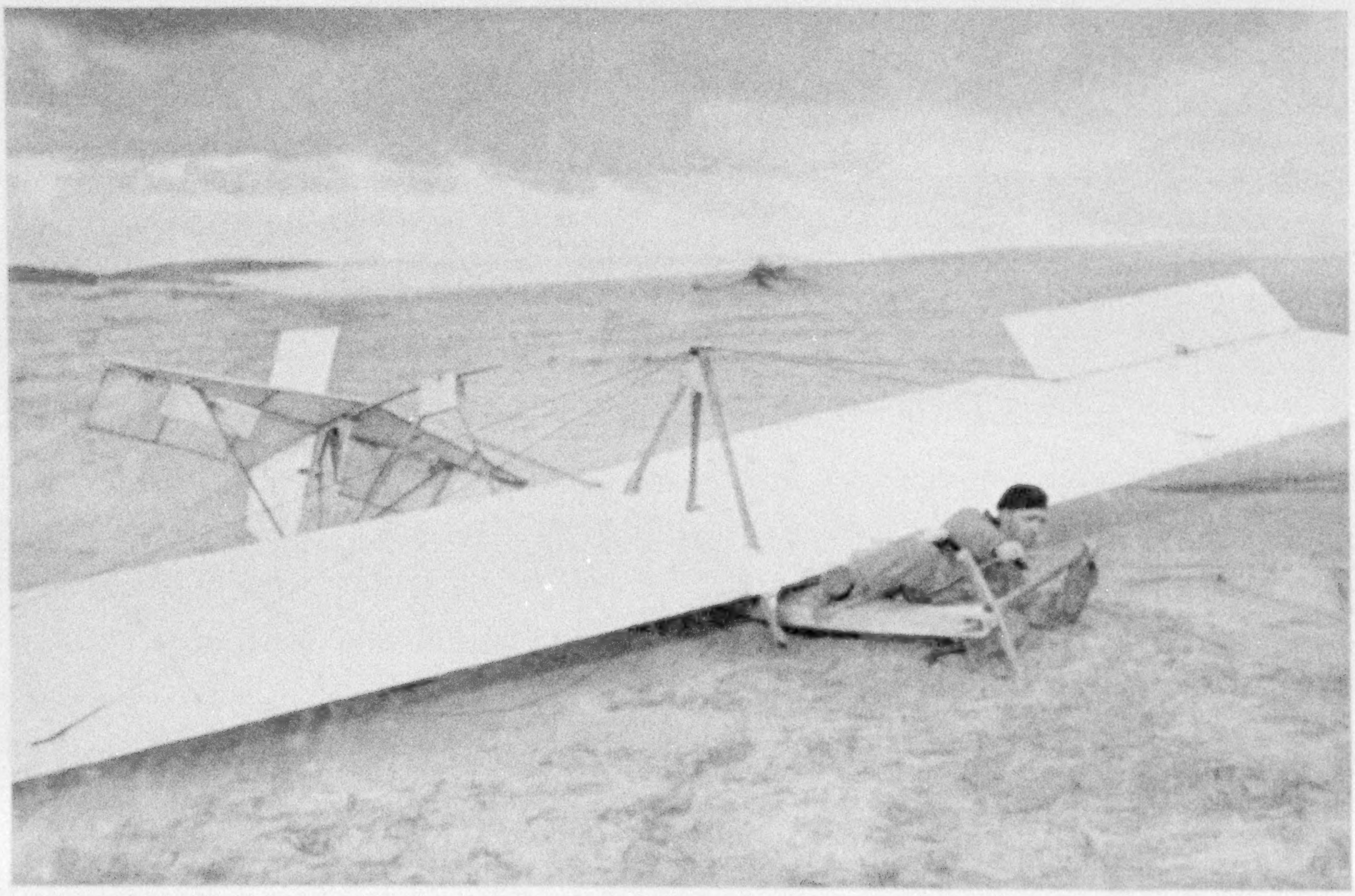
Weighing from 200 to 300 pounds, but



Photograph by Alex Stöcker

IN FLYING, RELAX YOUR BODY, BUT NOT YOUR MIND, SAYS THE INSTRUCTOR

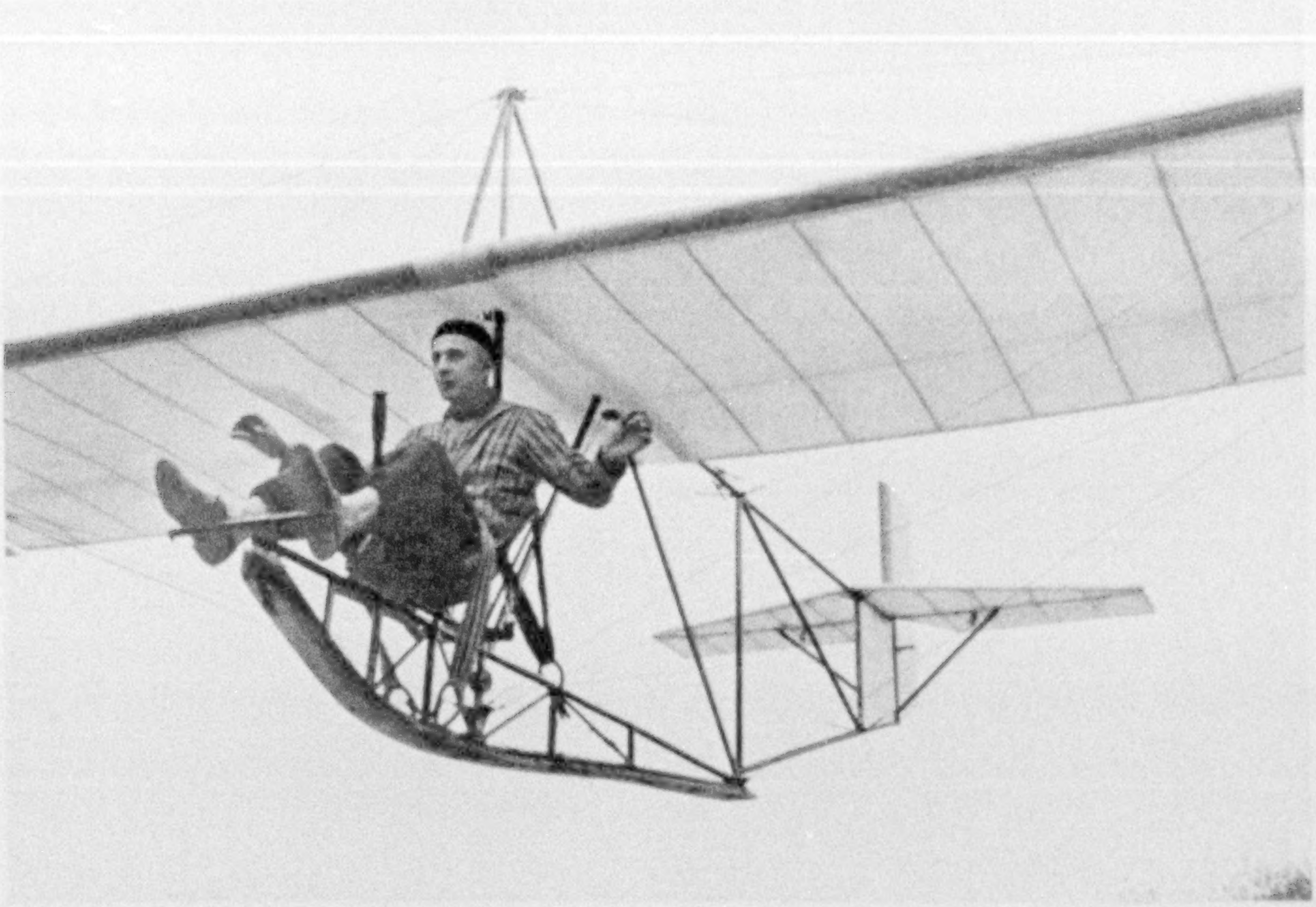
With his right foot pressing the crossbar, nosing down a bit to gain speed, and using his ailerons to give his plane a slight starboard tilt, this boy is about to make a right turn in perfect form.



Photograph by Robert Kronfeld

WHEN A MAN CRASHES, GLIDERS SAY HE "TAKES HIS MACHINE TO PIECES"

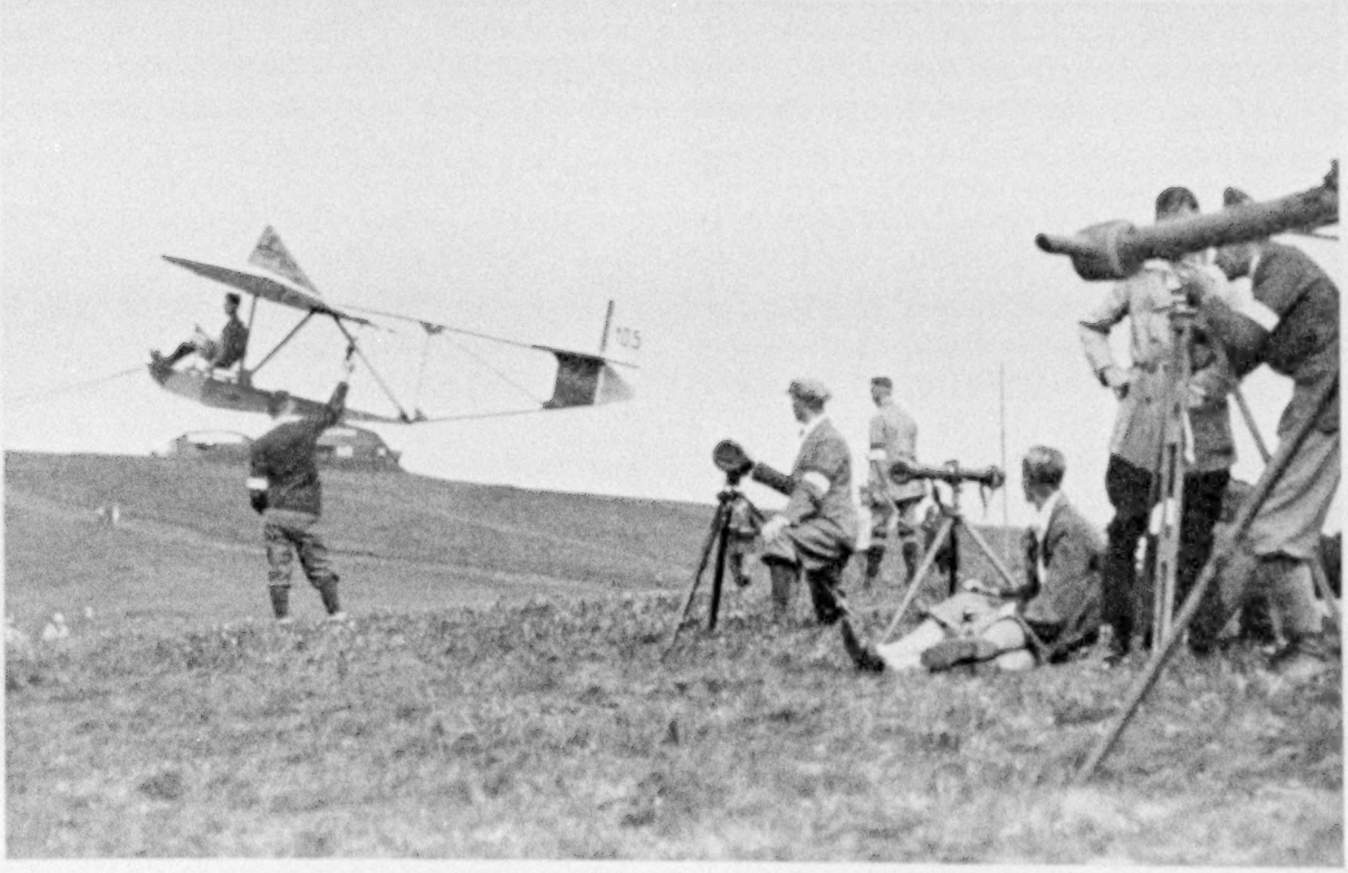
When one pupil "takes the machine to pieces" his companions must give up hope of flying the same day, as they are expected to assist in repairing the broken "bird"—an effective lesson in unselfishness and comradeship.



Photograph by Lange

IN THIS WELL-BALANCED GLIDER THE STUDENT FREES THE STICK AND IT FLIES ALONE

The framework of the Zögling, or pupil glider, is composed of steel tubes. The span of its wings is 33 feet and their width is five feet three inches. The glider without its pilot weighs approximately 200 pounds.



Photograph by Alex Stöcker

THE ZÖGLING GLIDER, IN WHICH STUDENTS TAKE THEIR FIRST LESSONS

The beginner's plane has no fuselage and no cockpit. The pilot sits out front, under the wings (see illustrations, page 752). Broken parts are easily replaced. This student is just taking off before a group of meteorologists.

Photograph by Robert Kronfeld

A GLIDER BECALMED ABOVE WATER RARELY ESCAPES A DUCKING

When all wind fails, a glider must descend. German flyers, forced down while gliding out over the sea, have had difficulty in rescuing their planes without injury. These craft are so light and become water-logged so quickly that the wings easily break off.

with a wing surface of more than 20 square yards, a light sail plane easily floats upward on an air current, carrying its rider with it. But the pilot does more than ride. Fitting snugly into the body of the structure itself, the flyer feels almost as if he himself were equipped with wings and tail. This similarity is apparent, as one watches a skillful flyer manipulating his sail plane. Pilot and plane seem one entity; every movement of the plane is a movement of the man inside, and *vice versa.*

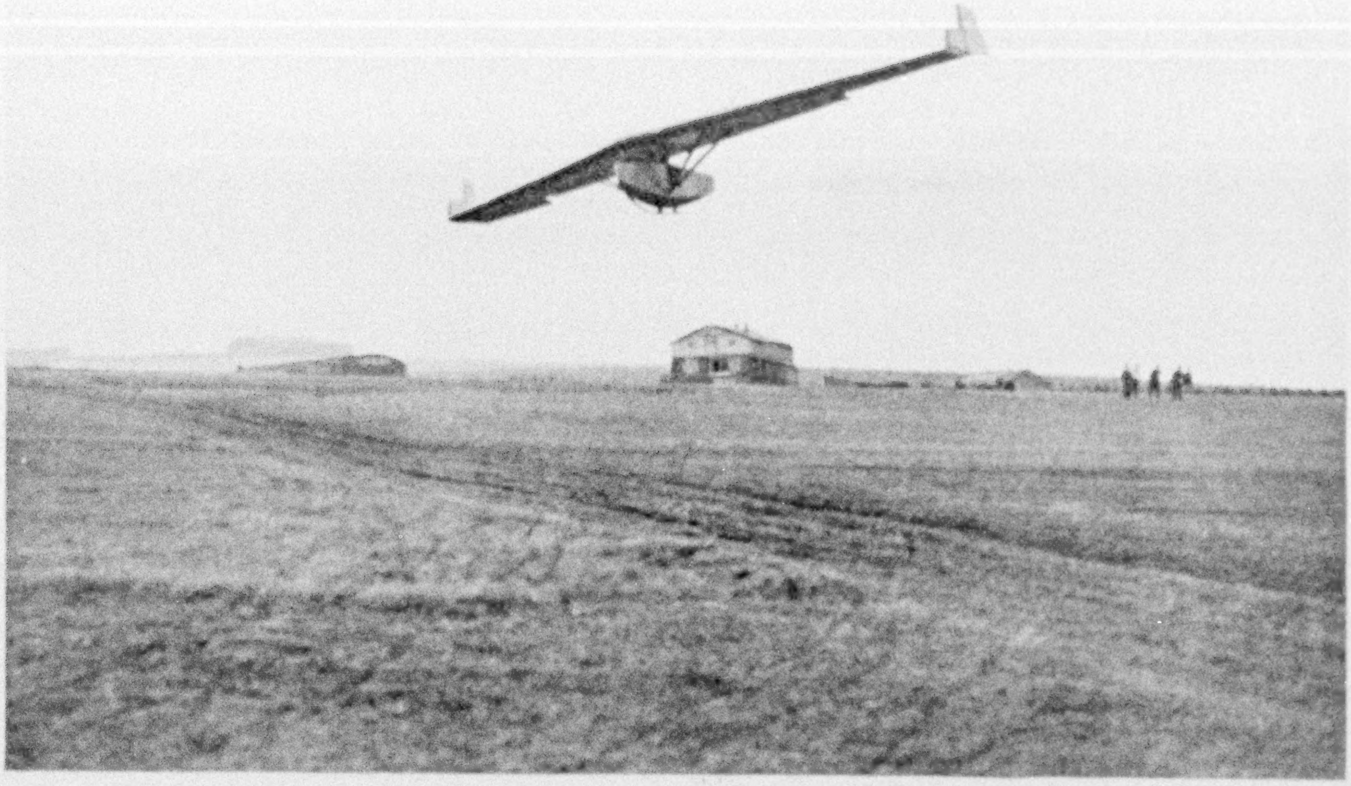
THE SAIL PLANE IS STARTED WITH A CATAPULT

Flying a plane with no motor in it seems less miraculous to the man on the ground when he hears how it is built. The conspicuous feature of the sail plane is its very long, narrow wings—sometimes as much as 59 feet in length and less than 5 feet in width. Narrow the wings must be, for broad ones would create too many eddies, and long they must be to provide the surface to lift a man's weight.

While simple gliders often start merely by sliding or being dragged down a hillside, so light in structure is the sail plane that were it started slowly it would only tumble about like thistledown in the wind and get at once out of control. Hence, in launching, an elastic rope device is used, which shoots the plane into the air like a stone from a sling.

The pilot must maintain this speed by pressing down the nose of the plane, which decreases the angle of the tilt of the wings. The earth's gravity will then draw the plane downward in a gently slanting line of flight, which is called a glide. Thus the gravity of the earth is the engine of the engineless airplane.

The fact that the sail plane continues to glide downward while the vertical air currents are carrying it up may seem to some as involved as Einstein's theory of relativity; but when one studies the explanation which Robert Kronfeld, one of the instructors at the flying school in the Rhön Mountains, gives to his pupils, this phe-



Photograph from Howard Siepen

EXPERIMENTING WITH A TAILLESS, MOTORLESS PLANE

The wings are arrow-shaped, with a rudder at the tip of each wing, instead of a tail rudder.

nomenon ceases to appear mysterious. "Suppose you let a model glider fly down from the ceiling at one end of a room to the floor at the other end," he tells them, "and imagine a giant lifting the whole room high up into the air, then the model plane would be gaining in altitude while gliding downward."

That sail plane is best which sinks most slowly, or, to use the technical expression, which "has a low sinking velocity," for such a plane will not only respond to very slight upward currents, but also give the pilot a better chance to reach the next vertical current.

When flying across country, in a plane with no engine, the airman progresses simply by coasting, as it were, from high up in one vertical air current to the foot of the next. Of course, these upward currents are invisible, but a trained gliding man learns where to look for them.

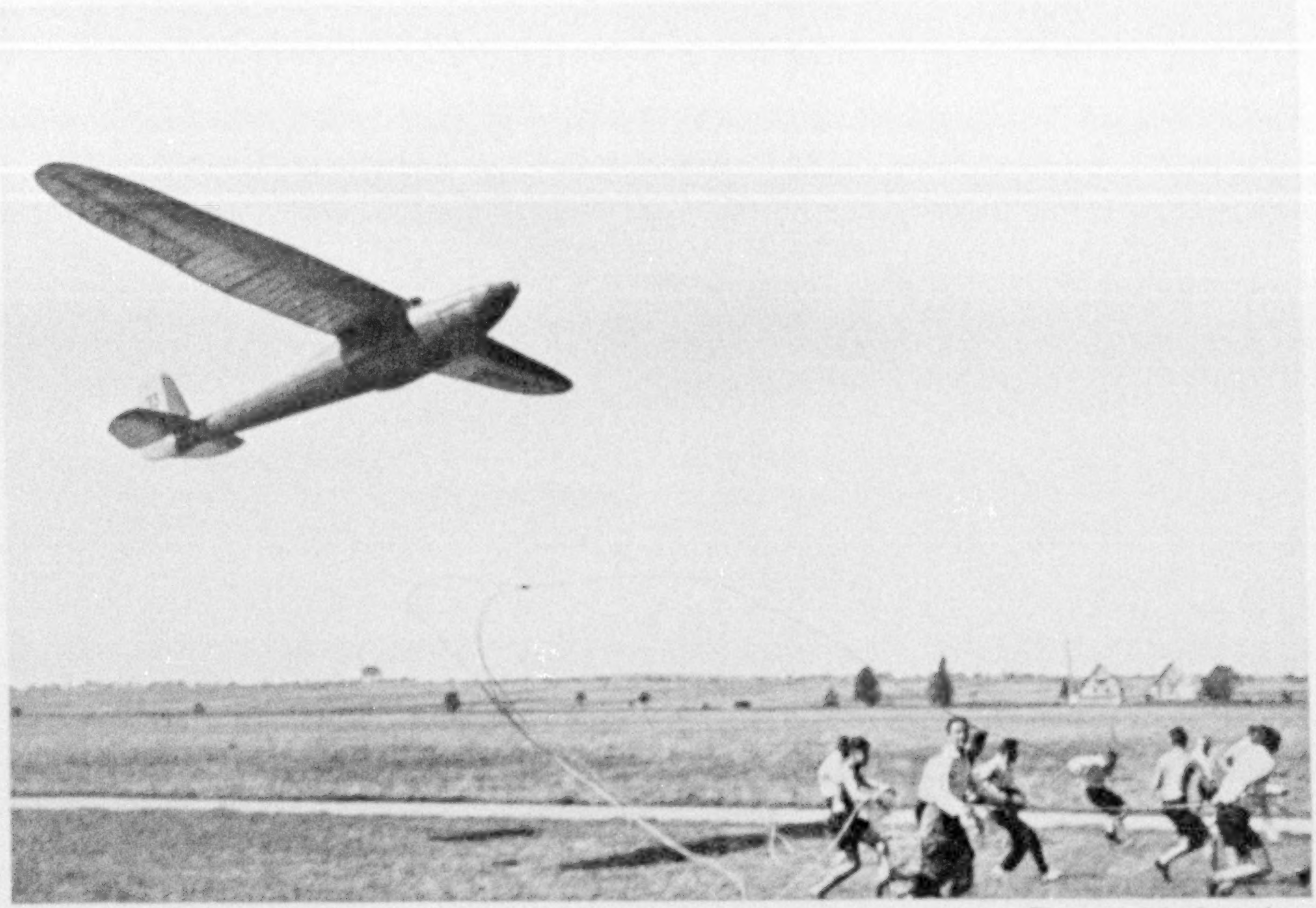
With an ideal sail plane of low sinking velocity, it takes about 16½ minutes to glide to earth from an elevation of 2,000 feet. In the average crude gliding machine, however, one would descend in about half that time.

But the devotee of the sail plane is not merely interested in a plane that sinks slowly; he also seeks one that travels fast and far. The best that have been built in Germany will fly between seven and eight miles, gliding down from an altitude of 2,000 feet. Such a ratio, in this case about 1 to 20, is called "the gliding figure."

Speed, of course, is a prime factor in motorless flying; the faster the airman can glide, the quicker he can get from one vertical air column to the next. Sometimes, to get from one such column to the next, he has to glide against a strong wind. Hence there are "low-wind" and "strong-wind" machines.

So, then, speed, gliding figure, and sinking velocity are the three factors in the ideal sail plane. So far, the Germans have found it practically impossible to combine these three factors perfectly in any one plane. It is still a battle between the aërodynamical best and the technically possible.

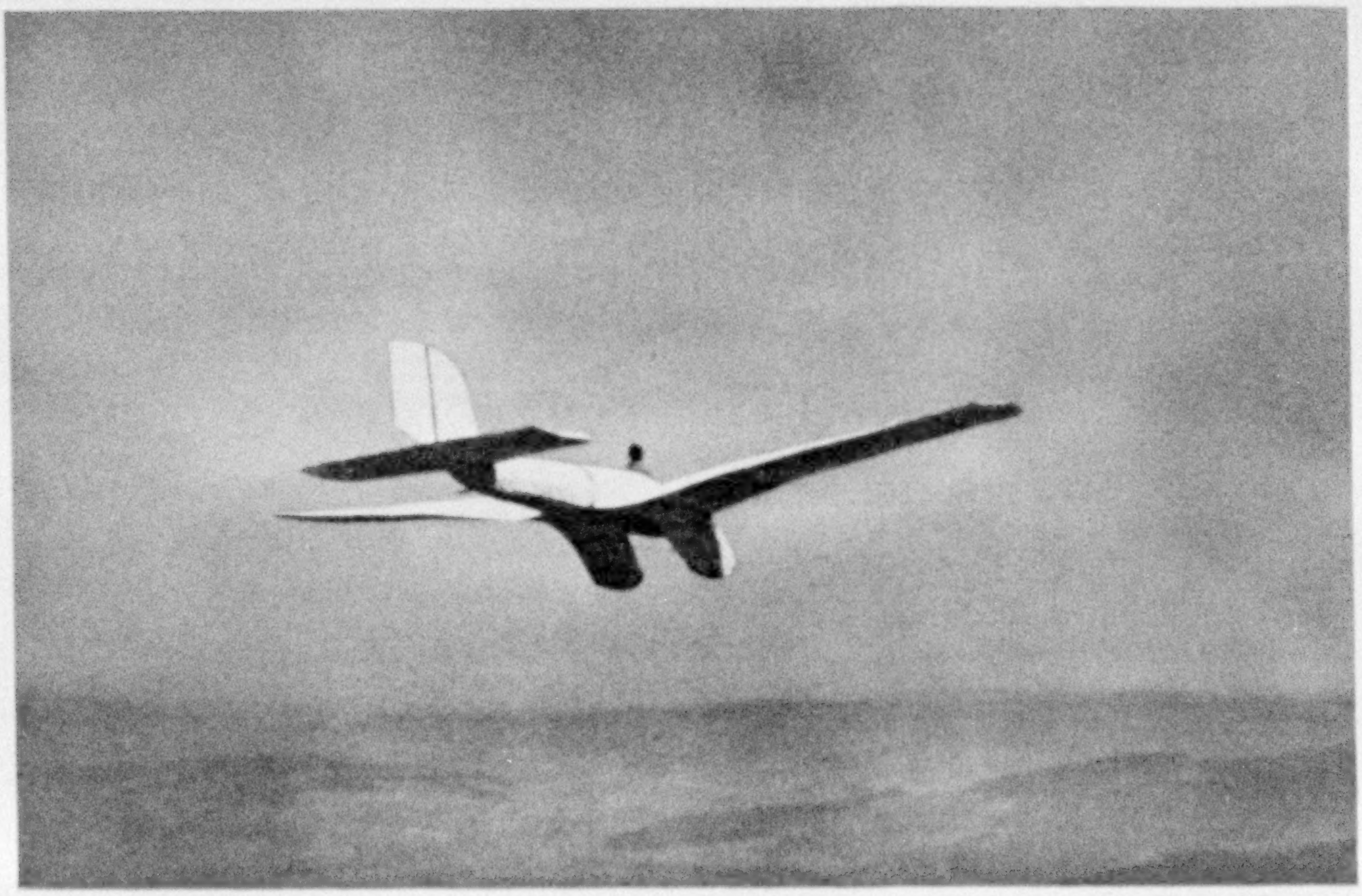
And yet, uncanny and mysterious as a sail plane appears to the layman on the



Photograph by Lammle

LAUNCHING A SAIL PLANE FROM A LEVEL FIELD NEAR COLOGNE

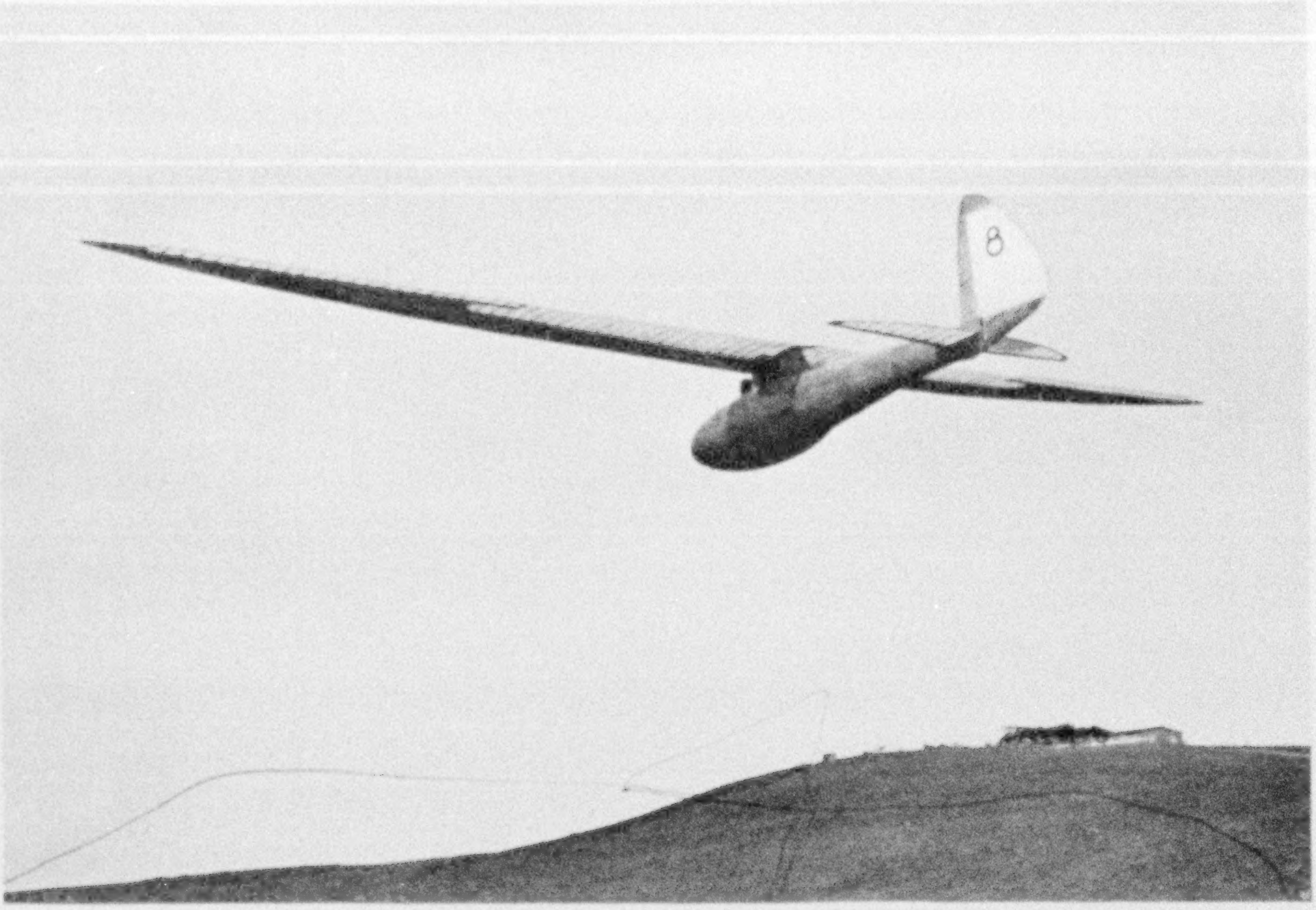
Wolfram Hirth's *Württemberg* is starting from level ground. Twelve men and a double rubber rope were needed to launch it. Successful experiments have been made to start a plane with the help of a motorcycle, the rear wheel of which wound up the rope.



Photograph from Howard Siepen

THIS MONOPLANE GLIDER USED A LANDING GEAR RESEMBLING SLED RUNNERS

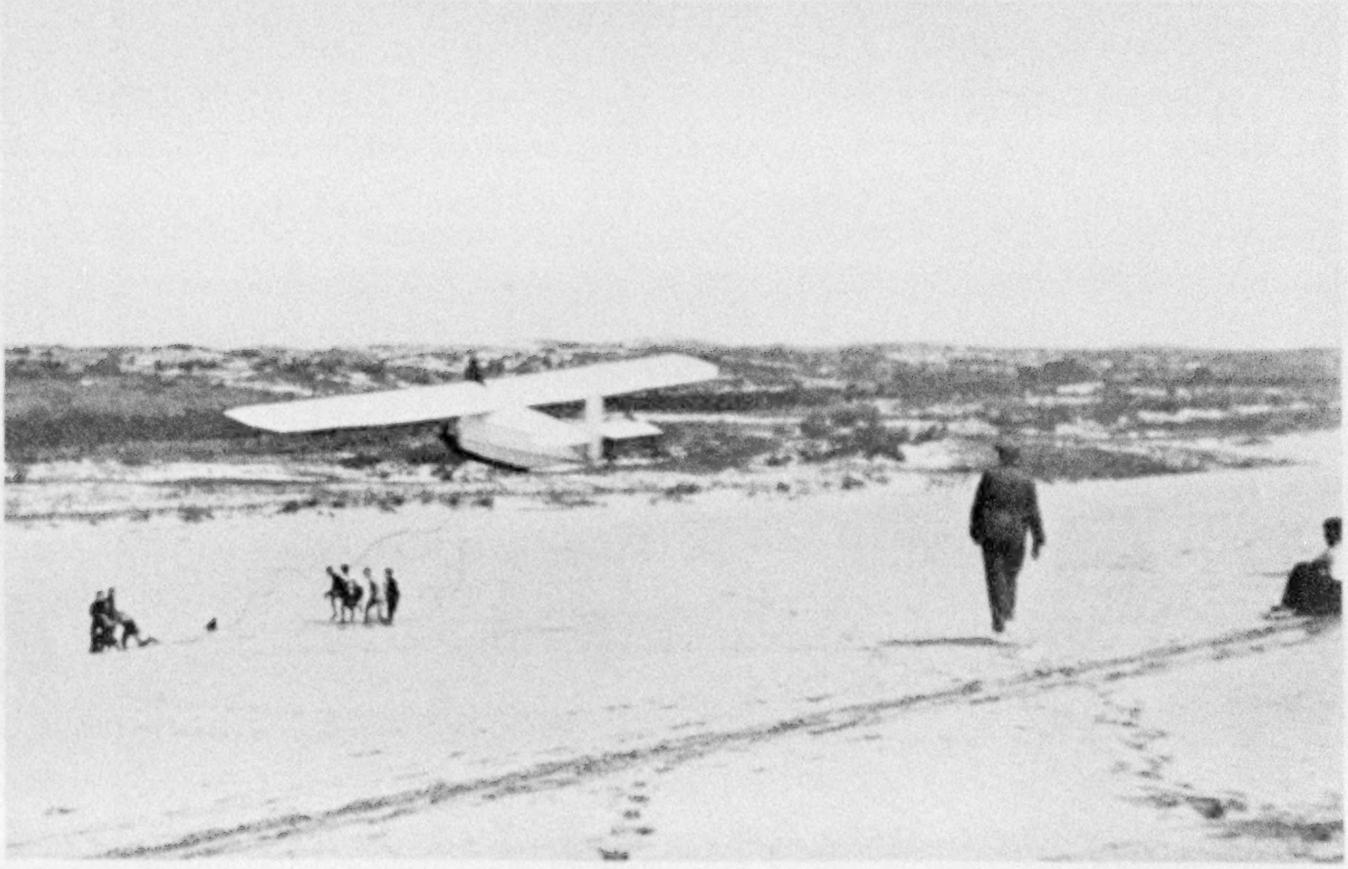
In this odd craft a German, Klemperer, was the first to glide to a destination previously agreed upon (see text, page 778). In 1921 he glided more than three miles, reached his objective, the village of Gersfeld, and also broke the world's glider record for time aloft.



Photograph by Rhön-Rossitten Co.

UNIVERSITY STUDENTS IN MUNICH BUILT THIS 62-FOOT SAIL PLANE

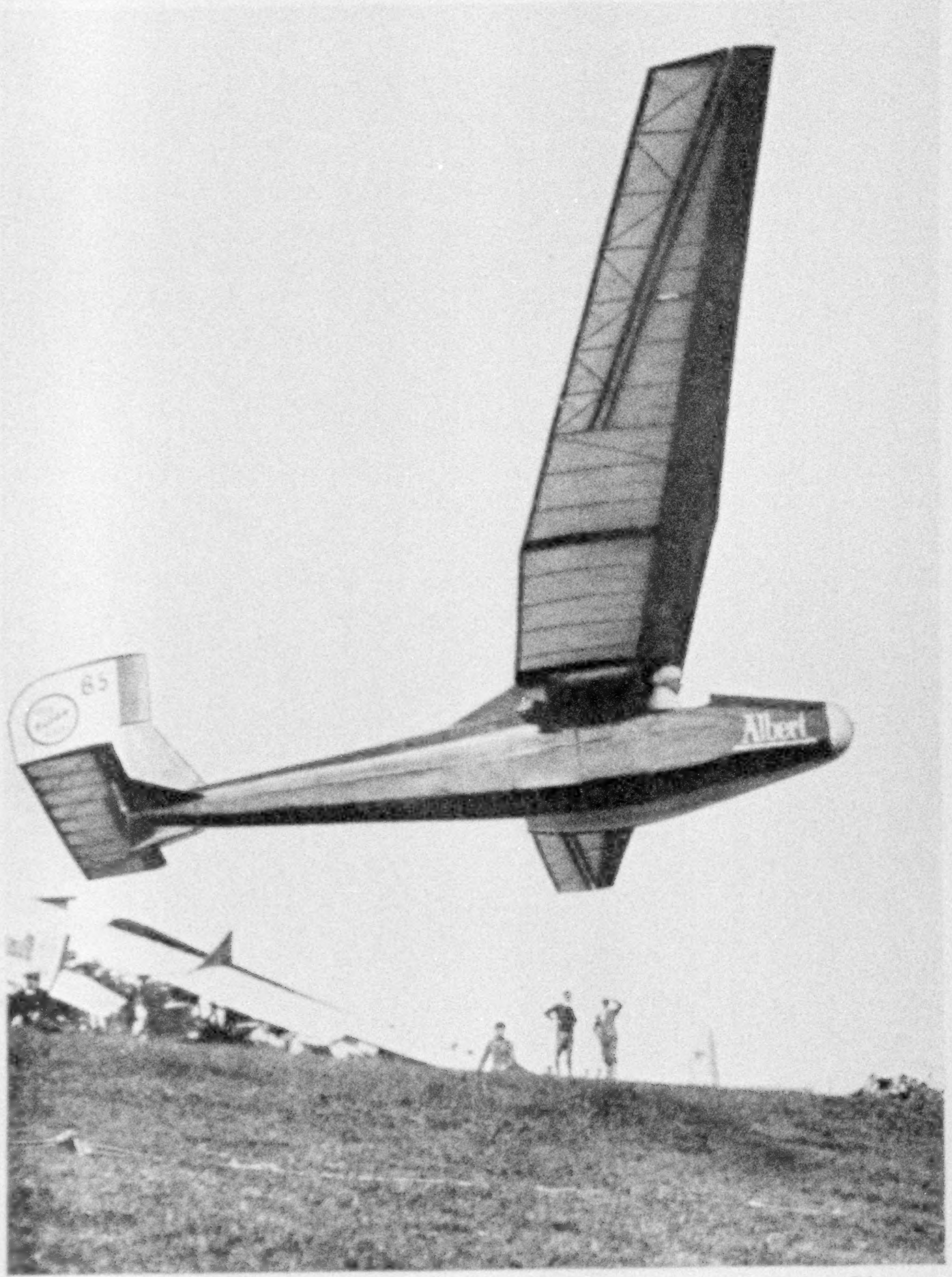
It sinks, when gliding normally, less than two feet a second. This is considered an extremely "low sinking velocity" (see text, page 759) and is due to its excellent wing curve. The elastic rope, with which the plane has just been launched, is seen falling away.

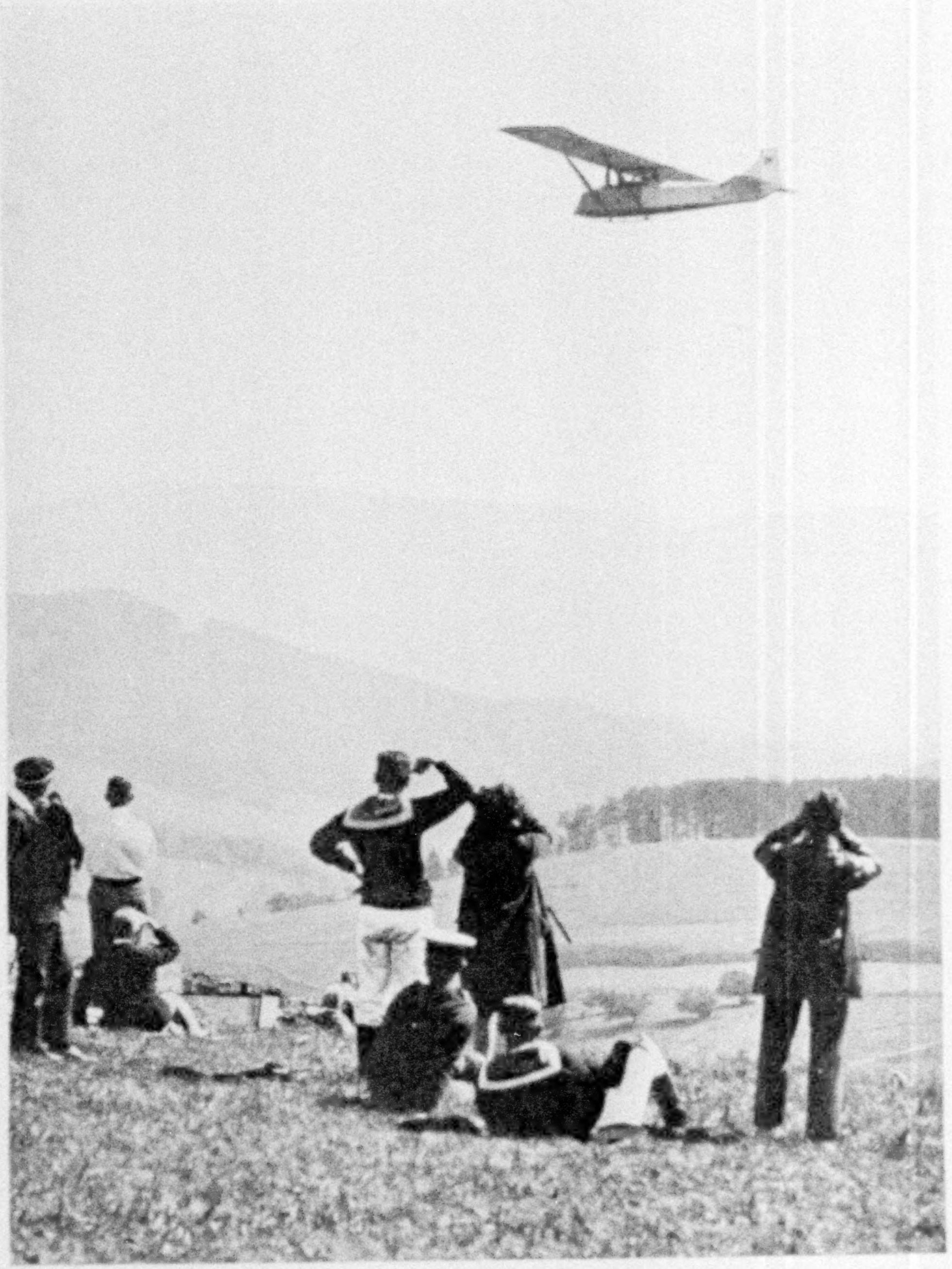


Photograph by Howard Siepen

AN INSTRUCTOR WATCHES HIS PUPILS LAUNCH A GLIDER FROM A SAND DUNE

The pupil in this monoplane is trying for his B license, to gain which a clean glide of one minute must be made in the form of the S-curve. In gliding circles the highest praise for a good flight is to say that it was *sauber*—clean.





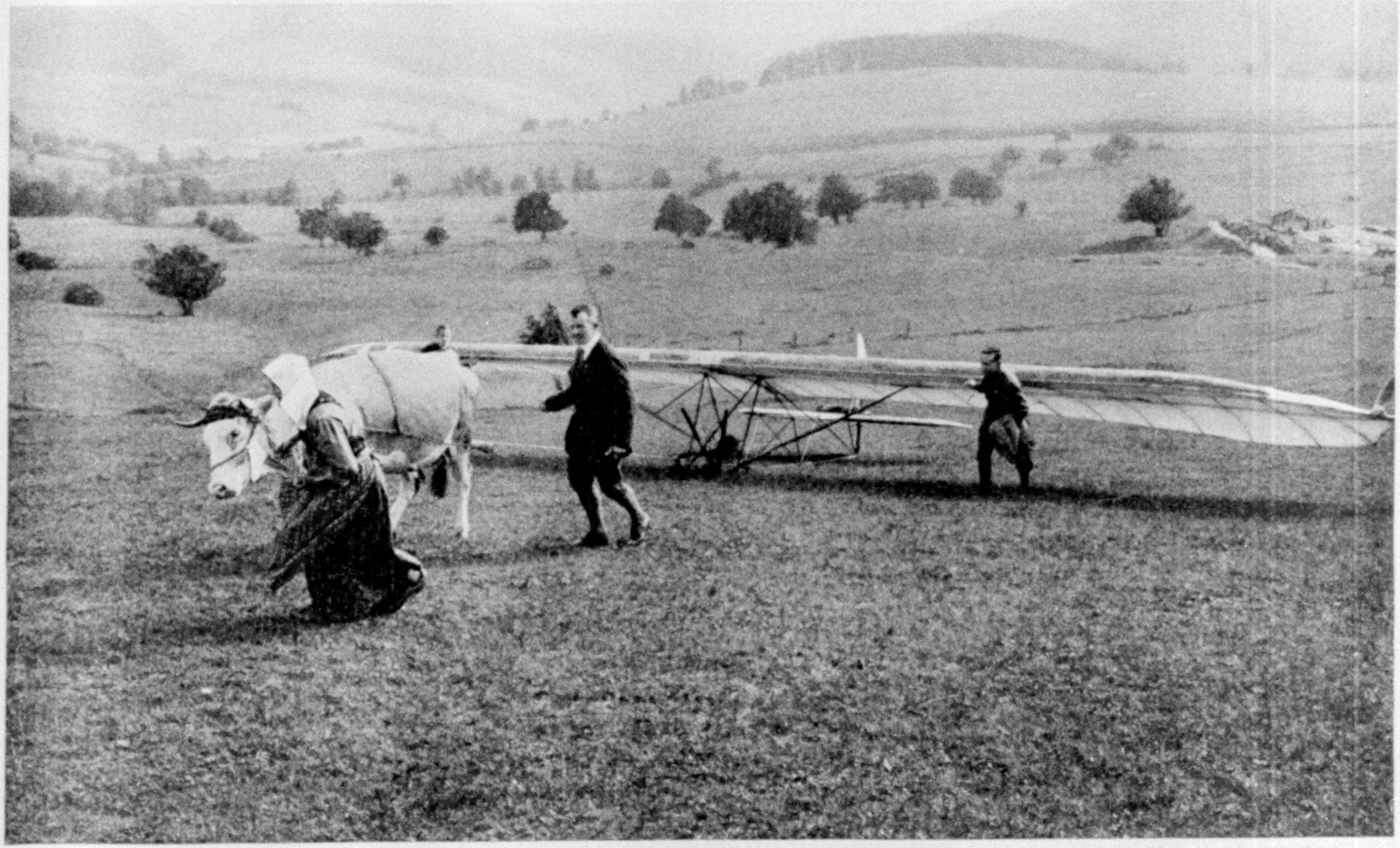
Photographs by Alex Stöcker

A RECORD-BREAKING GLIDER TAKES THE AIR

Riding an air current which produced a cumulus cloud, the German pilot Edgar Dittmar, in this glider, reached an elevation of 2,542 feet, directly above the spot from which he took off.

THE PRÜFLING (GRADUATE) TYPE OF GERMAN SAIL PLANE

Though built with a rectangular wing of the same span as a glider, this craft, developed by the firm that designed the Zögling (see page 757), is equipped with a streamline fuselage. Its pilot rides in a cockpit.



Photograph by Alex Stöcker

AN ODD COMBINATION, OR WHAT FACETIOUS STUDENTS MIGHT CALL A "BOVINOPLANE"

This home-coming is not, however, quite so ignominious as it looks. The peasant woman's cow is being used simply to drag the glider back up the hill to the take-off place.

Photograph by Alex Stöcker

THE GRACEFUL, WIDESPREAD WINGS OF GLIDER KRONFELD'S CRAFT, IN WHICH HE REMAINED ALOFT FOR NEARLY EIGHT HOURS

ground who watches it weaving and sailing about overhead, painstaking experience and infinite study have greatly developed it since the pioneer days of Lilienthal, Chanute, and the Wrights. Its sinking velocity, speed, and gliding figure are all determined by its weight, its wing curve, its wing surface, and its head resistance to the air as it moves.

RIDING "SILENT AS A GHOST"

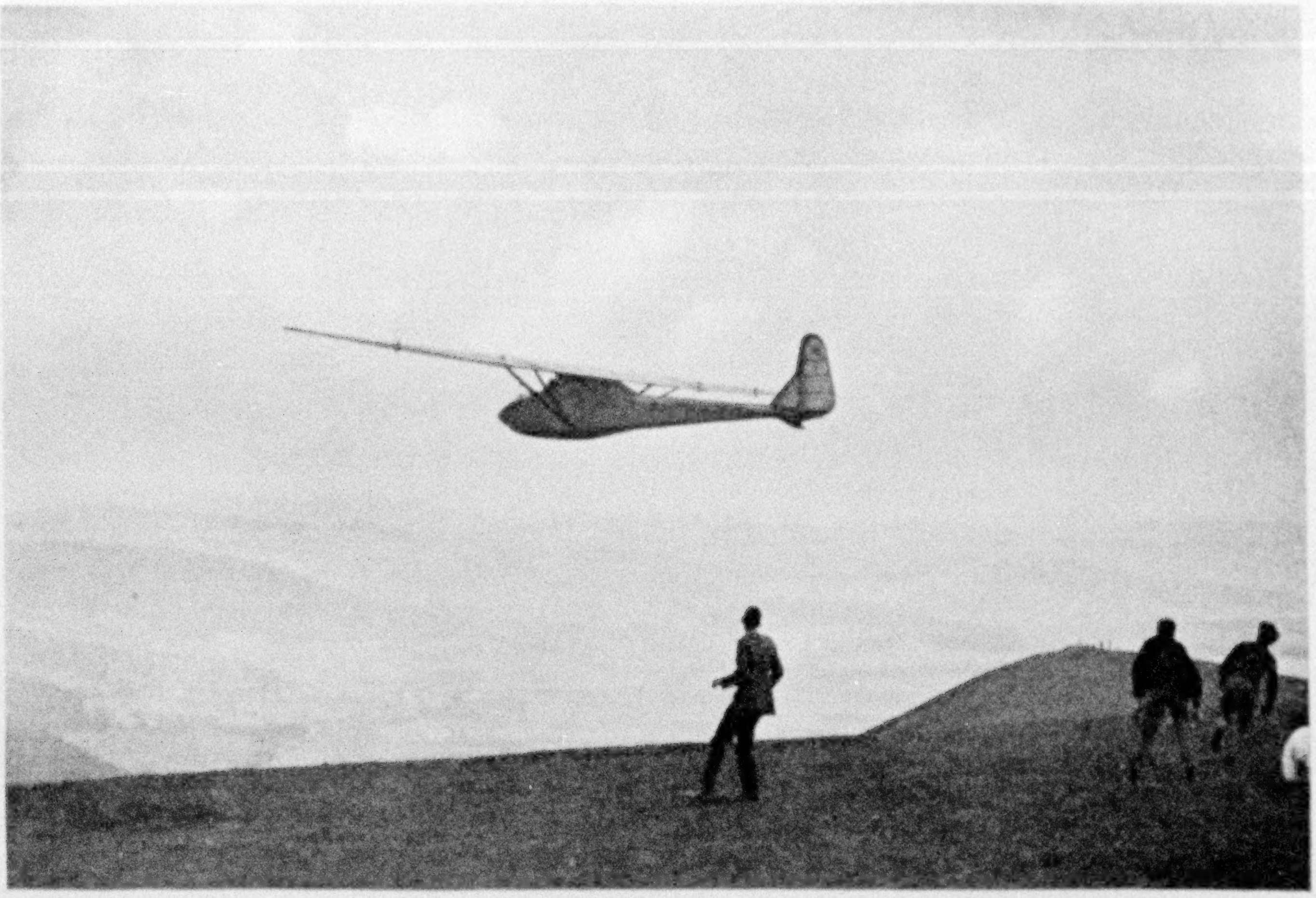
But no factor in gliding, discovered since the days of Lilienthal, is so useful as the vertical air column. Of all such currents, the best known and most used is that called the "slope upward," found in mountainous country. It is created when an air current hits a hillside and rushes upward. By starting against this, a sail plane easily gains altitude.

"From a hilltop of the Wasserkuppe I shot off into space like a torpedo, by using just such a 'slope-upward' air stream," said Wolfram Hirth, a contestant in the 1928 glider meet in the Rhön Mountains.

"Low clouds were near and in a few turns I was among them. Silent as a ghost, I slipped through the gray, wet clouds. With a soft breeze against my tail, I floated gently, with a feeling of utter detachment from all earthly things.

"Easily and calmly sailing that feather-like bed of mist in the empty sky aroused fantastic thoughts, as of boyhood days in Sunday school, and the pictures of immortals carried aloft through fleecy clouds by the angels. . . . Then, out of the mists again, into bright sunshine, and just ahead the familiar Himmeldankberg.

"But in my drift through the clouds I had lost much height. So much, in fact, that though I cruised along the mountain slopes I not only failed to gain height, but was nearly forced down. My tail-skid was actually scraping through the grass of a meadow when the upcurrent from a tiny break in the mountain slope threw me suddenly more than 90 feet straight up into the air! An 'air bump,' aviators would call that current. But it kindly gave me enough elevation to go on over that mountain slope. Here a group of boys, herding some cows, came running up as my skid swept the grass, hoping to



Photograph by Rhön-Rossitten Co.

KRONFELD TAKES OFF IN HIS MOTORLESS MONOPLANE FROM THE WASSERKUPPE

see me land. But again I took the air, probably to their youthful disappointment.

A DIZZY SIDESLIP OUT OF THE CLOUDS

"Cruising easily about for half an hour, I again found myself high in the clouds. Once more the dense, white mists folded about me. With no instruments aboard, I turned my plane to the wind, feeling for its direction and strength. But I must have banked too steeply on the curve. A quick, powerful gust hit me unexpectedly and, in a split second, I was floundering helplessly in the most dangerous situation of all my flying career.

"Now the air fairly roared past—and I was falling! I pulled the elevator up, but only felt the wind tearing faster past my sides. In the next instant I fell out of the clouds, with one wing down, in a dizzy sideslip.

"But, once below the clouds, I could see the ground again and judge the position of my plane. A quick, gentle pressure on the rudder and I was righted, on an even keel.

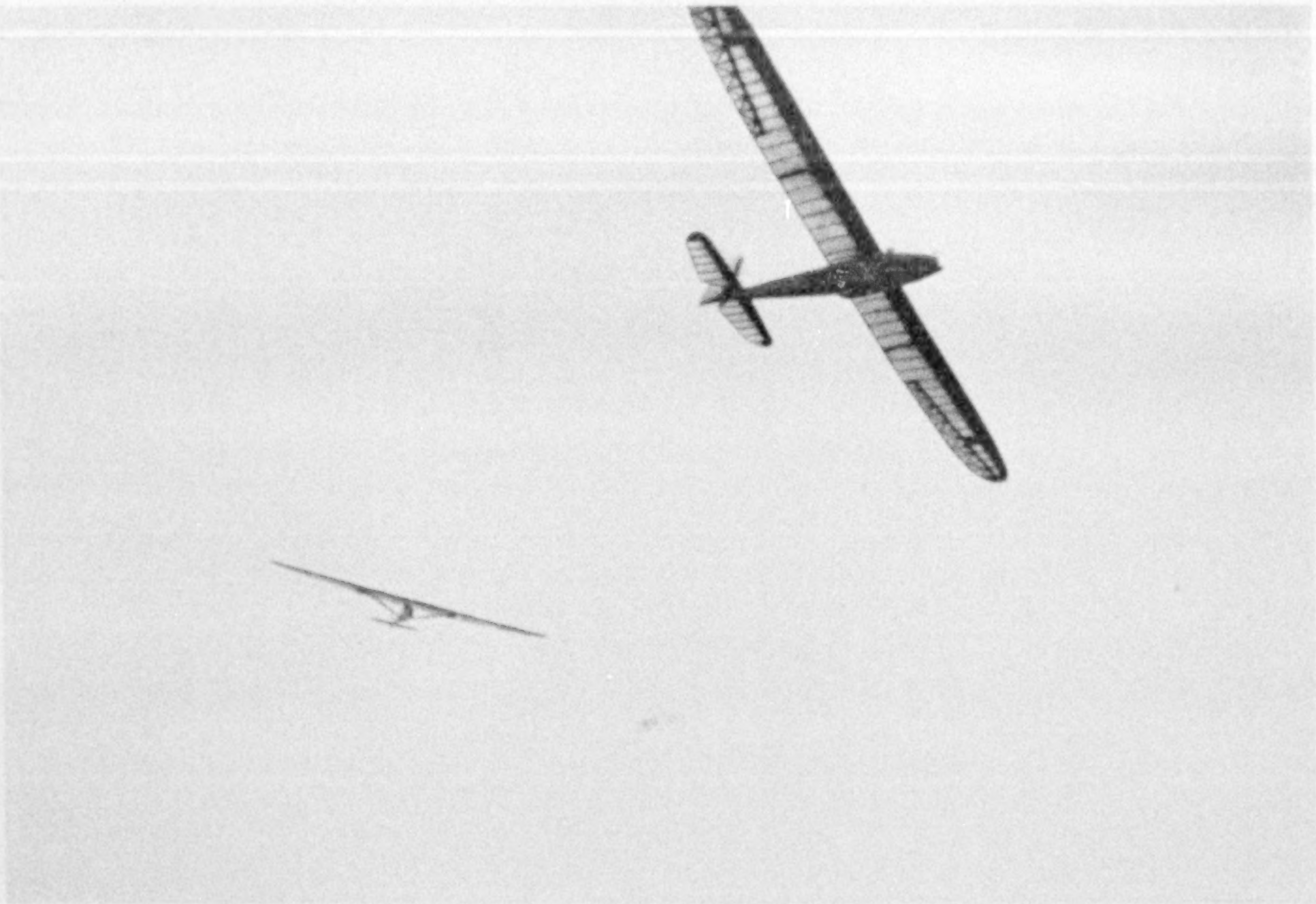
"Below me now was the Kreuzberg, with its old monastery sheltering its many crosses and pictures of calm, kindly saints, who never dreamed that one day men would fly over the world and look down on its temples—pagan and Christian.

"Flying now below the fog and clouds, or through patches so thick that now and again I lost sight of the ground, I flew over the village of Sandberg toward a forest.

SAIL-FLYERS DREAD FORESTS

"No sail-flyer likes forests. They lack landing places. But I managed to keep safely above the trees. Then I saw a wide valley ahead, with light-green meadows and steep slopes running in a direction that promised me helpful air streams. It was so far away that I was doubtful of my ability to reach it. But by carefully using every slope that offered upward wind, and climbing high on the vertical air waves there, I got to the valley. It proved to be that of the Saale River.

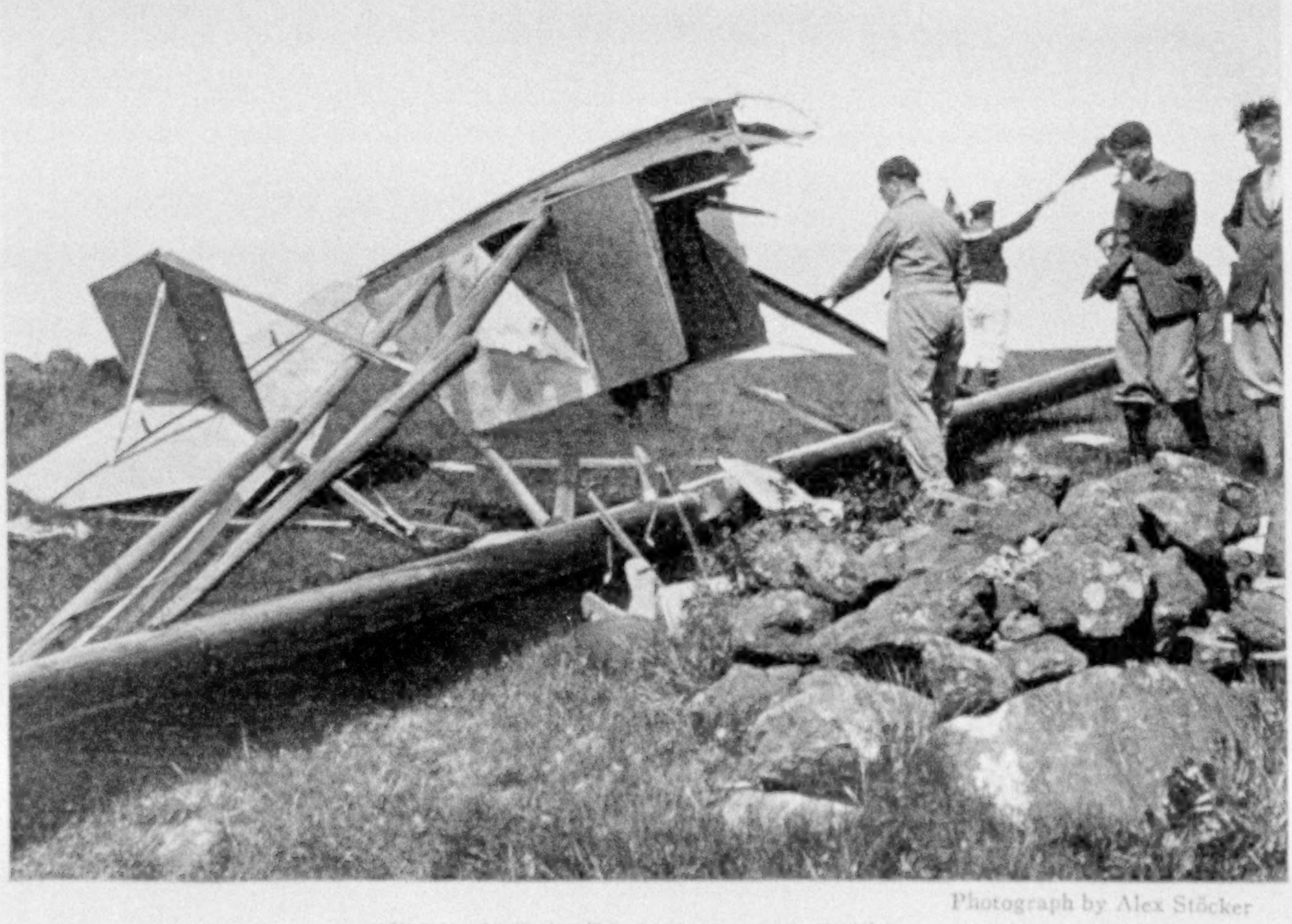
"But by this time I had again lost much altitude. In the river valley lay the hamlet of Steinach. I cruised low over it. My sudden, silent appearance just over their heads greatly astonished the inhabitants. They came running out into the road to see me land. But I had to



Photograph by Rhön-Rossitten Co.

AS BIRDS FIGHTING IN AIR, ONE GLIDER PURSUES ANOTHER

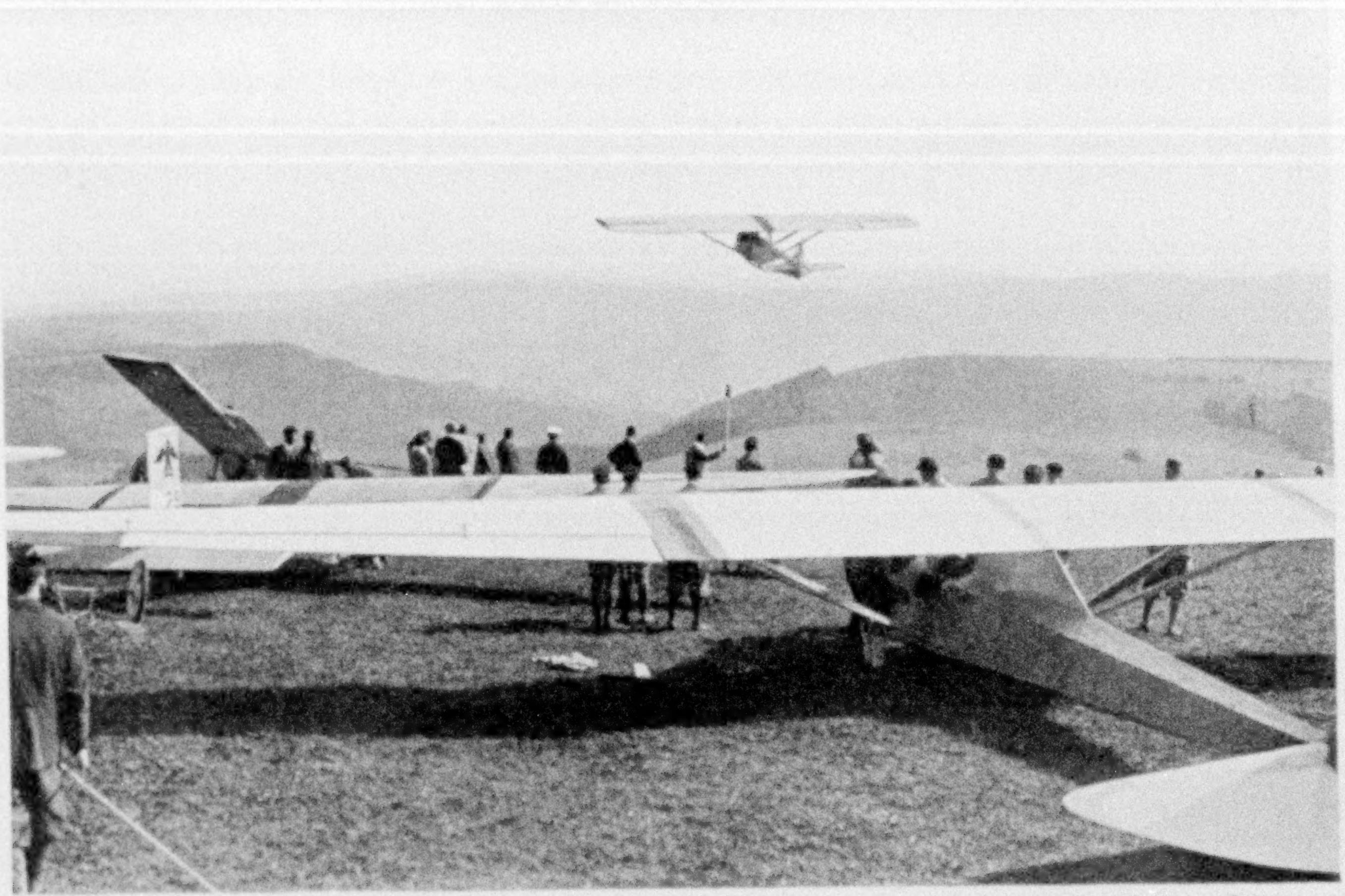
Hawks, gulls, and vultures float lazily, or bank and turn at will, with never a wing flap. Likewise, now, skilled glider pilots, their bodies one with their sensitive artificial wings, feel their way among the air currents.



Photograph by Alex Stöcker

FROM GLIDER TO JUNK IN A JIFFY

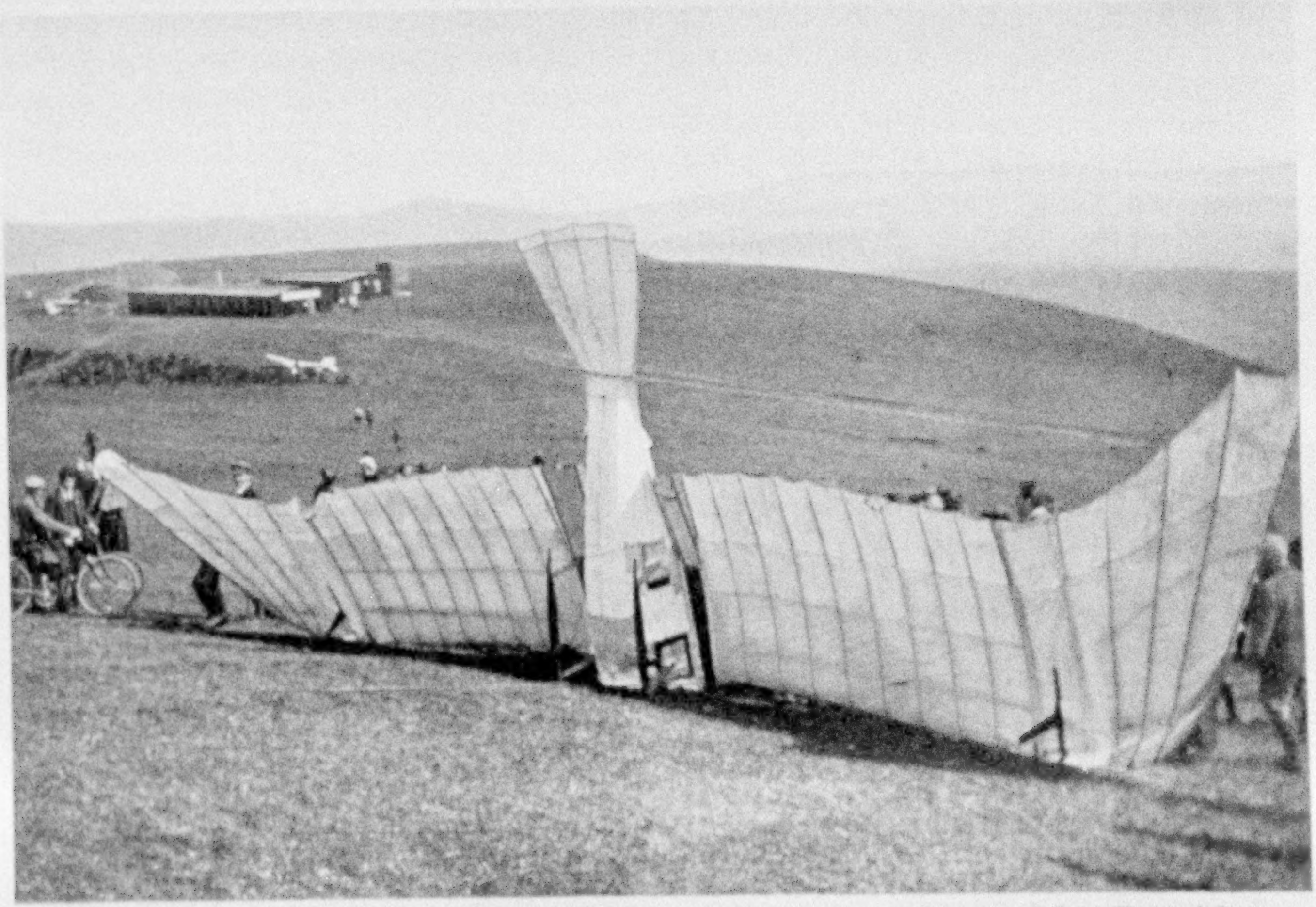
Such piles of stones are found quite frequently in the Rhön district. The pilot observed men turning hay and selected one of the hay heaps on which to land. It proved to be one of these stone piles and he crashed into it. He stands at the right, an injured finger in his mouth.



Photograph by Alex Stöcker

GLIDERS OF EVERY SIZE AND TYPE ARE SEEN AT GERMAN FLYING CAMPS

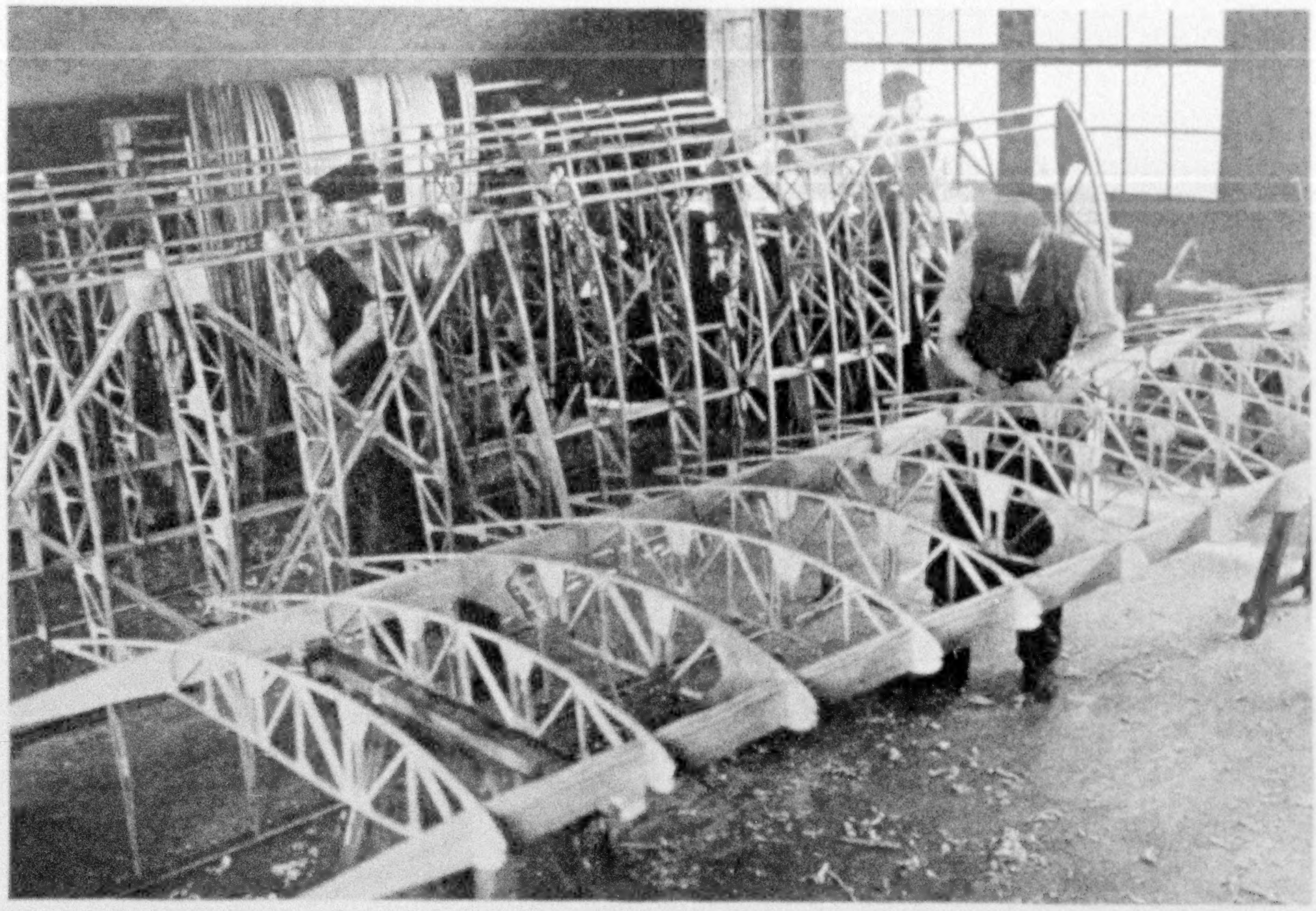
A Prüfling sail plane is just taking the air at the Wasserkuppe school. In the foreground is a double-seater, known as the *Mannheim*. The average Prüfling plane has somewhat longer and narrower wings than the Zögling, while its weight is the same.



Photograph from Howard Siepen

PROOF THAT MAN STILL HAS MUCH TO LEARN FROM BIRDS ABOUT FLYING

Men shape their planes like birds and soar in imitation of them, but tailspins and other calamities unknown to birds are inseparable from man's adventures in an element not his own, be he ever so skillful.



Photograph by Lange

SPRUCE AND PINE ARE FAVORITE WOODS IN GLIDER-BUILDING

So lightly made are these delicate gliders that a plane with a 50-foot wing-spread may weigh no more than 350 pounds.

disappoint them, too. By cruising steadily back and forth along the slope where the ruined Steinach Castle stands, I worked up high again.

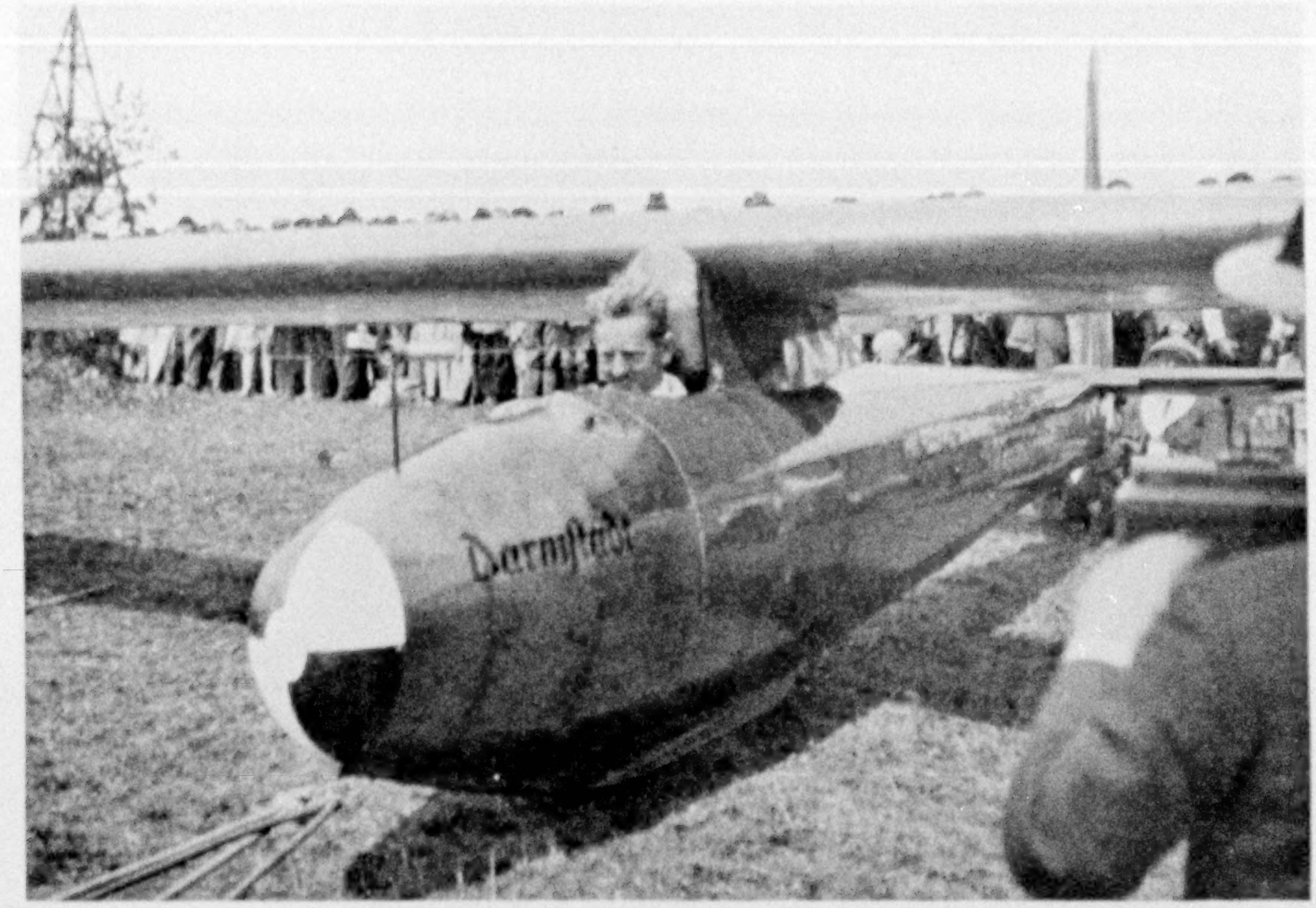
"This shows how a glider, carefully using upward air streams, seems to the uninformed to be working miraculously against gravity. When I arrived over Steinach I was only a few yards above its housetops. Now, as I left the village, twenty minutes later, I was sailing comfortably at an elevation of 500 feet!

"Following the broad Saale Valley, circling repeatedly over favorable slopes to gain height, I crossed over the villages of Bocklet and Grossenbrach. Then, pausing at a small, wood-covered hill to scan the country for other slopes which would help in flight, cruising up and down, I discovered in front of me the famous resort town of Kissingen. Near it was a large airdrome. A good place to light! But, when I saw mountains stretching along the outskirts of the town, I decided to stay up and risk flying across Kissingen.

"I was lucky enough to make it. Fifty yards above the railway depot I could not resist playing the rôle of the 'air ghost,' as on previous similar occasions. I shouted 'Hello there!' at the top of my voice. Passengers waiting on the platform for their train, startled by a shout from the skies, stared up in amazement.

"From slope to slope, across roads and forests, I flew; then along a railway, creeping up a valley. I knew I would not be able to continue much longer, but tried to cover as many miles as possible. On the left and on the right of the road and railway to Schweinfurt below me, two mountain ranges now came together in an acute angle. The northwest wind blew straight into this corner and I was caught as in a trap.

"Then an upward air stream lifted me so high that I could fly along the saddle and glide down gradually over the plain that lay behind. A motor car was just coming along the road. Here was a chance to reach a telephone. So I flew over the car, made a sharp curve, and landed smoothly 60 feet from the road, on a meadow. The driver took me to the next village, and ten minutes after my landing, the competition



Photograph by Howard Siepen

JOHANNES NEHRING IN HIS "DARMSTADT" SAIL PLANE JUST BEFORE A START

This plane has a wing span of 59 feet. Note the glistening, fishlike body.

management on the Wasserkuppe knew of my whereabouts."

SAND DUNES ALSO AID THE GLIDER

This airman's adventures show how a glider may fly where hills cause rising air streams. To a less extent, but also among seacoast sand dunes, air currents are formed strong enough to aid gliders.

Strong winds, blowing steadily in from the sea, often cause air currents to rush upward from the slopes of sand dunes even proportionately higher than upslope mountain air streams.

Thus, even among fairly low dunes, motorless planes have attained considerable altitude; also, the usually steady inshore breeze is helpful.

As one flyer told me, six hours of sailing over the dunes took less work and attention than three hours among mountains, where every depression in the hills made its own little air eddy.

Even a strong inshore sea breeze, breaking against coastal forests, forms an "upwind." This enabled Johannes Nehring, one of Germany's youngest expert birdmen, to fly over Cranz, a Baltic resort near Königsberg.

Sometimes these "upwinds" seem to rise at a distance offshore, and, despite the greater steadiness of the sea breeze, sail-flying along a coast is not without its thrills.

FLOATING IN SUNLIGHT, BETWEEN LAYERS OF CLOUDS

At the recent glider's competition at Vauville, in France, Herr Hirth made an extraordinary flight over the sea.

"The weather at Vauville on the day I started was far from favorable," he told me. "The sky was overcast. Clouds hung down close to the ground and stretched offshore for half a mile. Nor did they move the whole day long. Because of a strong upward wind, I reached them within a few seconds after taking off, and soon was enveloped in a heavy mist. The layer of clouds in which I was flying, however, could not be very thick, I told myself, because I had seen the sunshine through it in several places over the sea. So nothing remained but to push upward

Photograph by Alex Stöcker

STUDENTS OF GLIDING ARE TAUGHT TO BUILD AND REPAIR THEIR OWN PLANES

In the evening, after the day's flying is over, these boys gather in a small village inn halfway down the mountain. Sitting in a low room, lighted by an oil lamp which casts fantastic shadows on the walls and ceiling, the students talk of their adventures or listen, lost in dreams, chin resting in the palm of a hand, to the music of a fiddler accompanied by a concertina.

and trust to luck for reaching bright sky above.

"My calculations proved correct. The mist soon cleared, everything became lighter, and I was soon sailing my great bird more than 1,000 feet above the clouds. Of the earth I could now see nothing.

"More than a mile above me lay a second layer of clouds, pierced here and there by sunlight. Soaring thus between a floor and a ceiling of clouds was so marvelous an experience that I flew for fully three-quarters of an hour, enjoying the billowy panorama. My altitude meter showed I was up nearly 1,100 feet, so I finally decided to start off on my long-distance flight.

ROUNDING A DANGEROUS CAPE

"In order to circle around Cape Flamanville, a feat my comrades had failed to accomplish the day before, I flew fully two miles out across the sea. This, it should be remembered, was in a plane with no engine. I kept close watch on my "power reservoir," namely, my height, with the help of my altitude meter. I got around the cape safely.

"The flight was so calm that I had leisure to do some 'sight-seeing.' Below, on the beach, I saw a boy receiving a thrashing from his mother. I shouted down 'Hello!' as loud as I could. The sturdy lady immediately let go of the youngster, who seized his chance to run away. He may have mistaken me for his guardian angel! But an old woman, gathering driftwood on the lonely beach a little farther down, must have taken me for Satan himself. She sat plump down on the ground when she saw me flying silently and mysteriously along the dunes only 70 feet over her head.

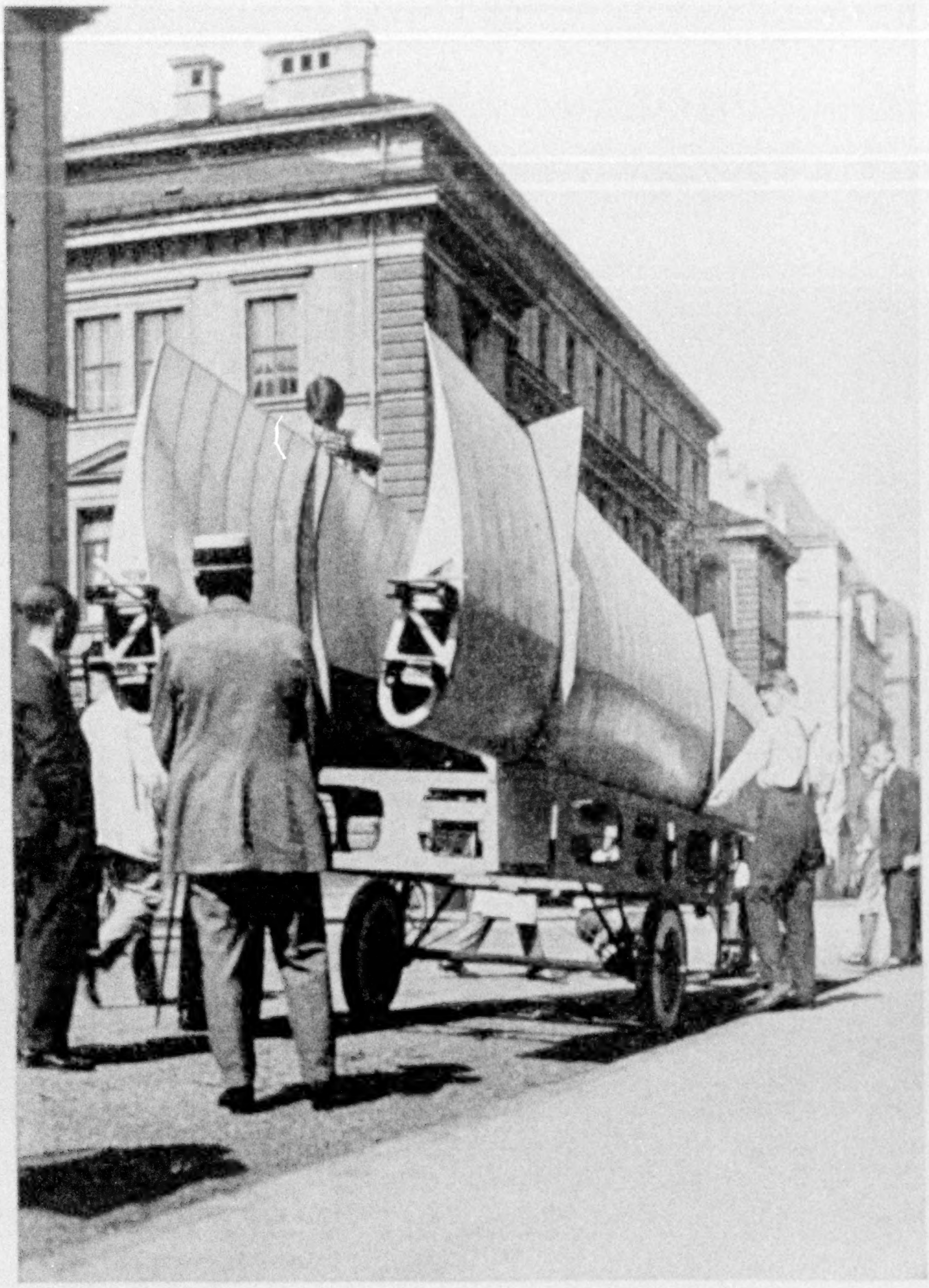
"After having covered 17 miles, the last and most difficult stretch of my motorless journey approached—rounding Cape Carteret.

"I had started on this dangerous bit of flying only 30 to 40 feet high, but soon began to sink rapidly, until I was barely

15 feet above the water. On my left towering rocks rose over my wing tip. To my right, just below me, was the dark sea. Already the spray of the breakers came splashing up to me. It was not what one could call a pleasant situation.

"Finally, however, I rounded the last corner of the cape and got out of danger. Now a wide, beautiful bathing beach, dotted with elegantly dressed holiday-makers, children playing in the sand, hotels and deck chairs, spread out before my eyes. It was the seaside resort of Carteret.

"I landed smoothly, and hundreds of people came running up from all sides, asking eager questions. 'Did you come from America?' 'Where are your engine and propeller?' Even a customs official appeared on the scene, insisting that I should declare my machine and demanding to see my passport. Then I was invited to dinner and much fêted. But, most of all, I was pleased at having made such a thrilling flight."



Photograph from Howard Siepen

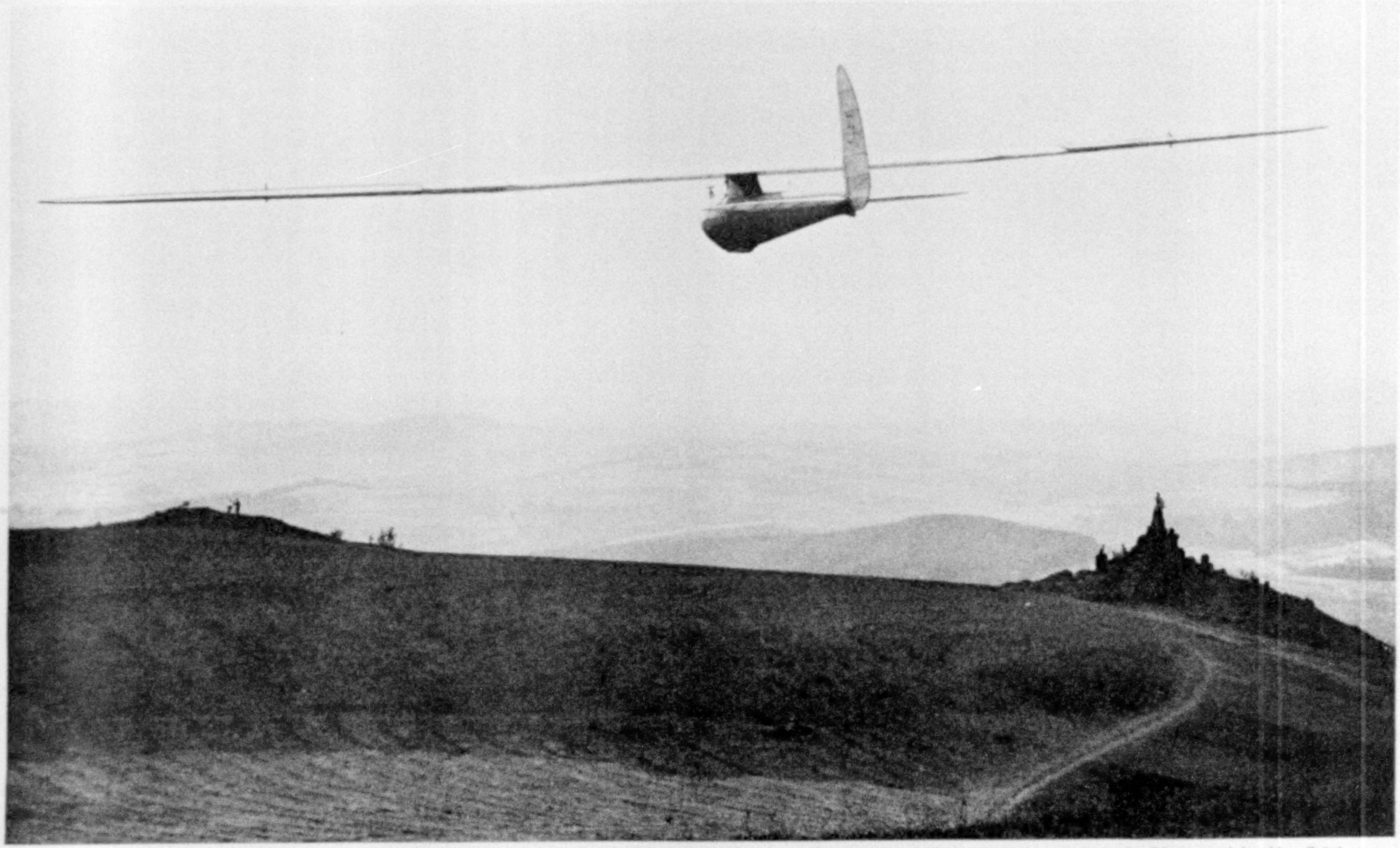
A GLIDER, MADE BY MUNICH COLLEGE STUDENTS, READY FOR SHIPMENT TO THE WASSERKUPPE FLYING GROUND

HANGING TO A CLOUD

One of the most interesting of all upward air currents is that which produces the cumulus cloud. To-day the pilots of highly sensitive sail planes "hang" themselves under such a cloud and are carried along and even sucked up by the uprising wind. This current may revolutionize the science of gliding, for it may enable a flyer to travel long distances.

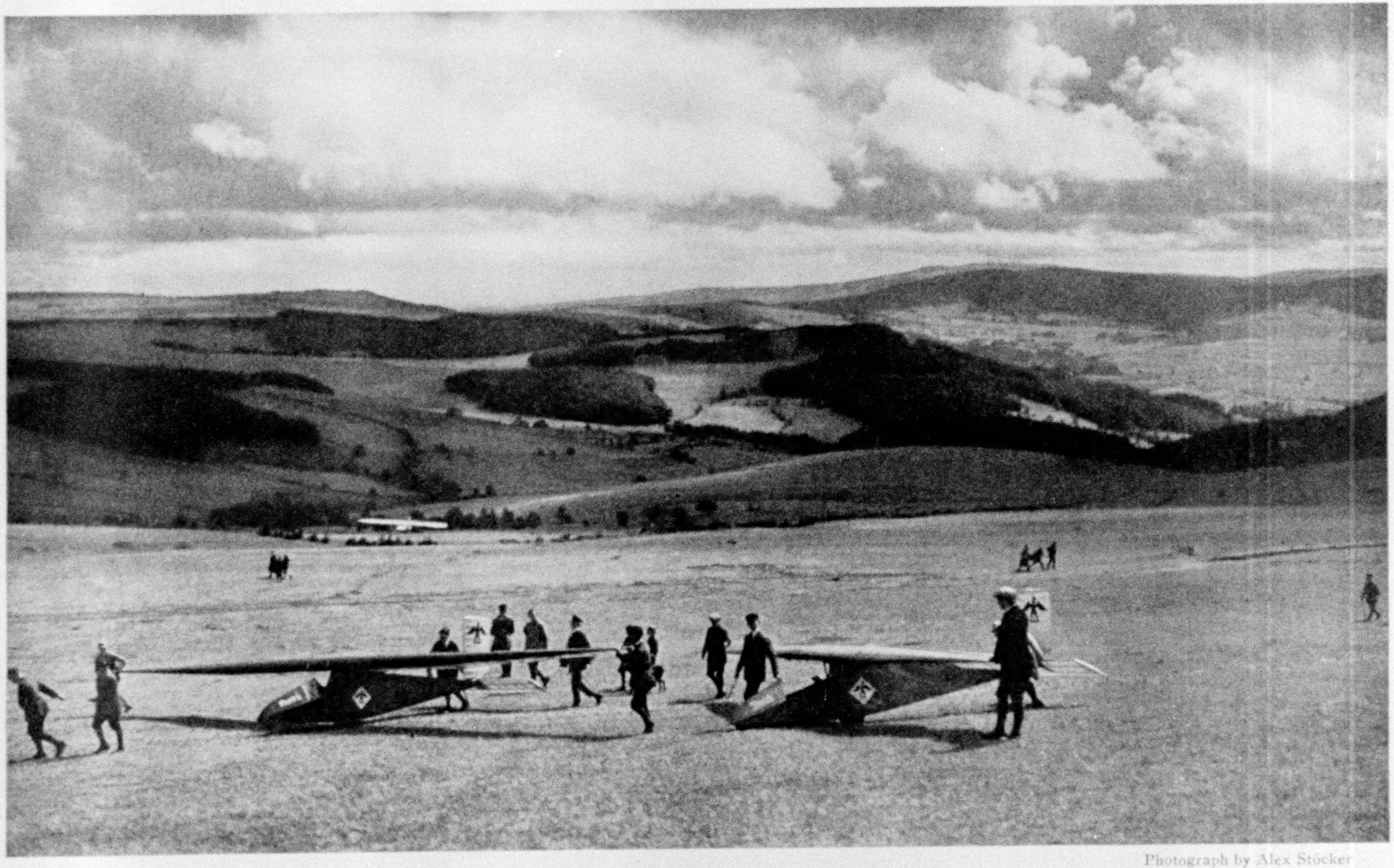
Two years ago, when Max Kegel, one of Germany's motorless flying aces, got into a mass of black thunderstorm clouds, everything around him was pitch dark. Hail and rain beat on the veneer of his fuselage and wings with the roar of a waterfall. He felt that he was being continually lifted, his machine resembling at times "a piece of paper that was being sucked up in a chimney." Later he escaped through an opening in the clouds and found himself flying at a tremendous height.

Later, Johannes Nehring was able to "sail-fly" under a cloud over flat country in the neighborhood of Darmstadt, south Germany, in an engine airplane which had been developed from a sail plane. Even in that heavy craft, with his engine cut



Photograph by Alex Stöcker

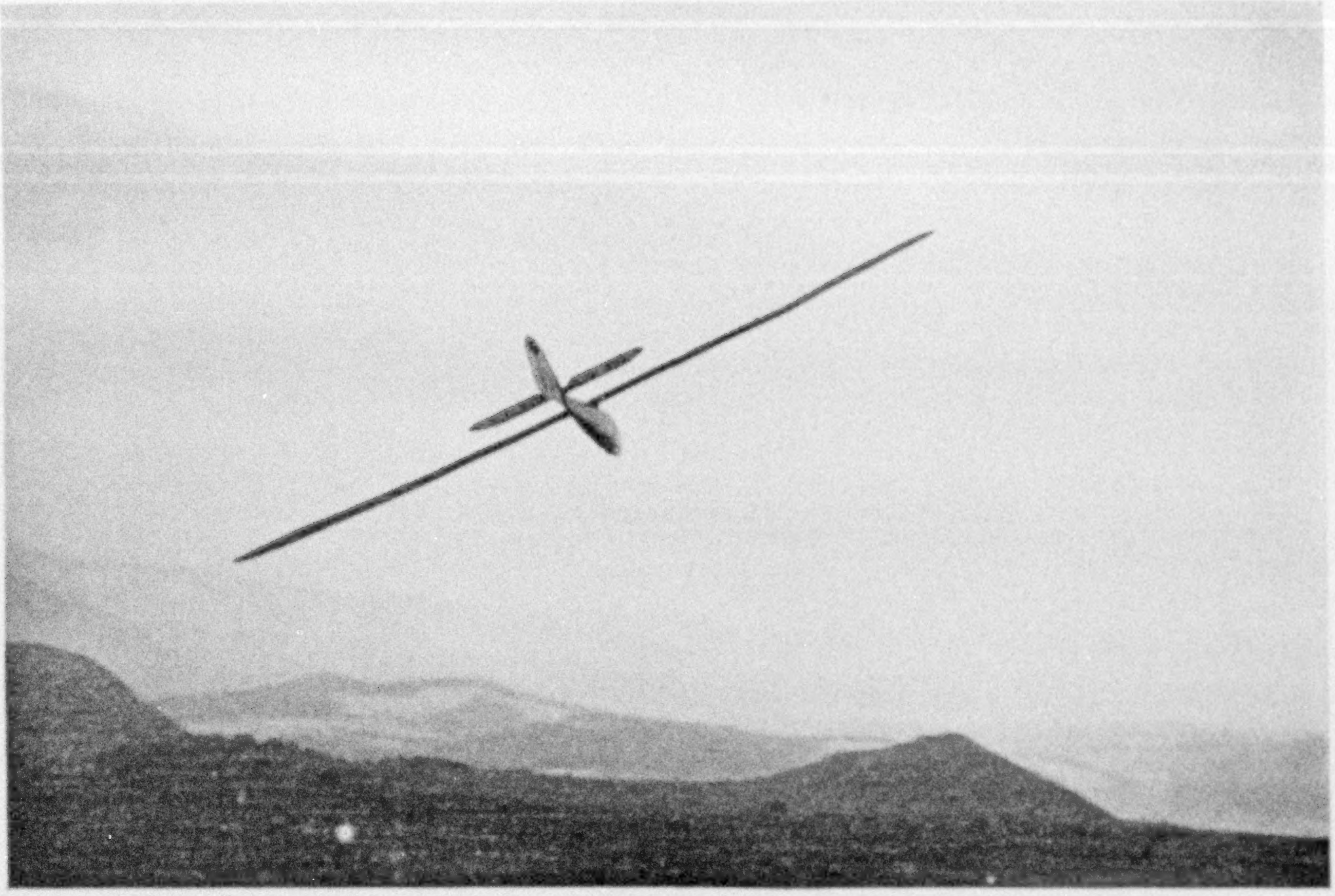
WITH THIN, SENSITIVE WINGS, UNDISTURBED BY ANY MECHANICAL POWER, THE GLIDER PILOT FEELS HIS SILENT, QUIVERING WAY, AIDED BY THE SLIGHTEST BREATH OF AIR



Photograph by Alex Stöcker

THE WASSERKUPPE REGION IN GERMANY, WITH ITS FAVORABLE TERRAIN AND AIR STREAMS, AFFORDS AN IDEAL PRACTICE GROUND FOR STUDENTS OF GLIDING

In the background are the Himmeldankberg and Kreuzberg, hills about which glider men circle on their long-distance flights. These two famous sail planes, the *Moritz* and the *Strolch*, are equipped with footballs instead of wheels or skis, as landing gear.



Photograph by Rhön-Rossitten Co.

FERDINAND SCHULZ FLYING A CURVE

The dark, three-cornered hillock in the background is the Pferdekopf (Horse's Head). It was between this hillock and the Wasserkuppe, from which point of vantage the photograph has been taken, that Martens flew like a shuttlecock when making the first one-hour flight by engineless plane in August, 1922. Schulz now holds the world's continuous-flight record of more than 14 hours and the world's record for flight with one passenger (see text, pages 779-780).

off, he gained height, being lifted by these cloud currents.

The flyer Edgar Dittmar established a new world's altitude record for gliders with the help of clouds. After he had worked himself up to a height of about 175 feet, using various slope winds, he let himself be sucked up another 800 feet to clouds. It is essential, he told me, to fly close up to the clouds in order to get into their range. It is also necessary to pick out the most advantageous position, for the cloud winds are not equally distributed.

Flying under clouds, the pilot must be alert, for if he turns his attention to the country down below or busies himself too much with his machine, it may happen that meanwhile the cloud changes its shape or dissolves, and there is no alternative but to land.

RIDING A STORM

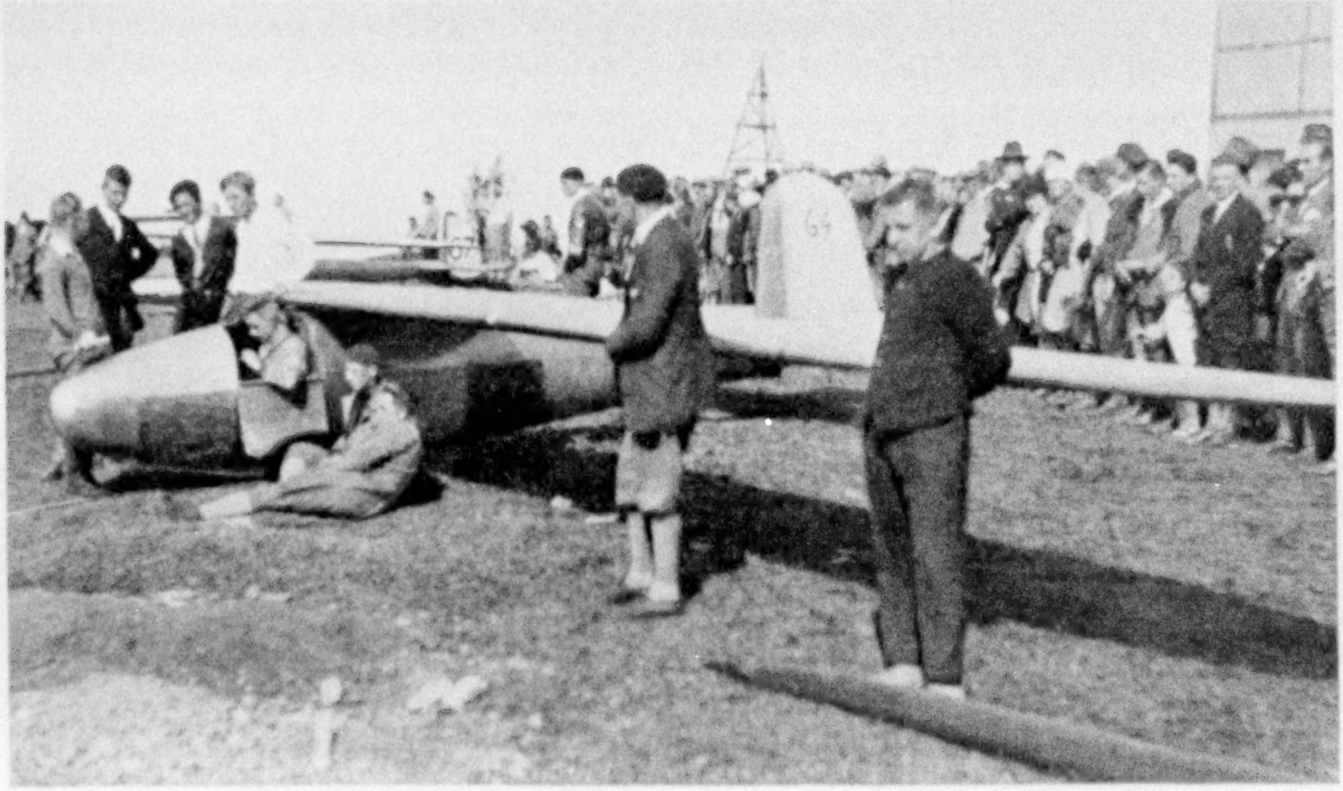
Then there are the vertical currents of warm air produced by the sun shining on certain objects on the ground, such as houses. It is by understanding and using all these various kinds of upwinds that glider pilots stay aloft and cover ground. New facts about the air ocean are being discovered continually—facts which the aviator in a power plane does not heed because he travels at great speed and upward air currents affect him only slightly. But just this multitude of possibilities demands of the sail-flyer constant alertness.

A story told me by Johannes Nehring, next to Ferdinand Schulz, Germany's leading "birdman," described the flight in which he established a then world's record for long-distance flying. He made 44 miles, using both "slope" and "cloud" upwinds (see, also, illustration, page 776).

"The wind was blowing west-southwest," said Herr Nehring, "and was rapidly gaining in force. 'In two hours we shall have a storm,' the weather man warned me. . . . High time, then, that I flew off, I told myself. So I shot up and away into the air. The Wasserkuppe and the many people standing about

Photograph by Lange

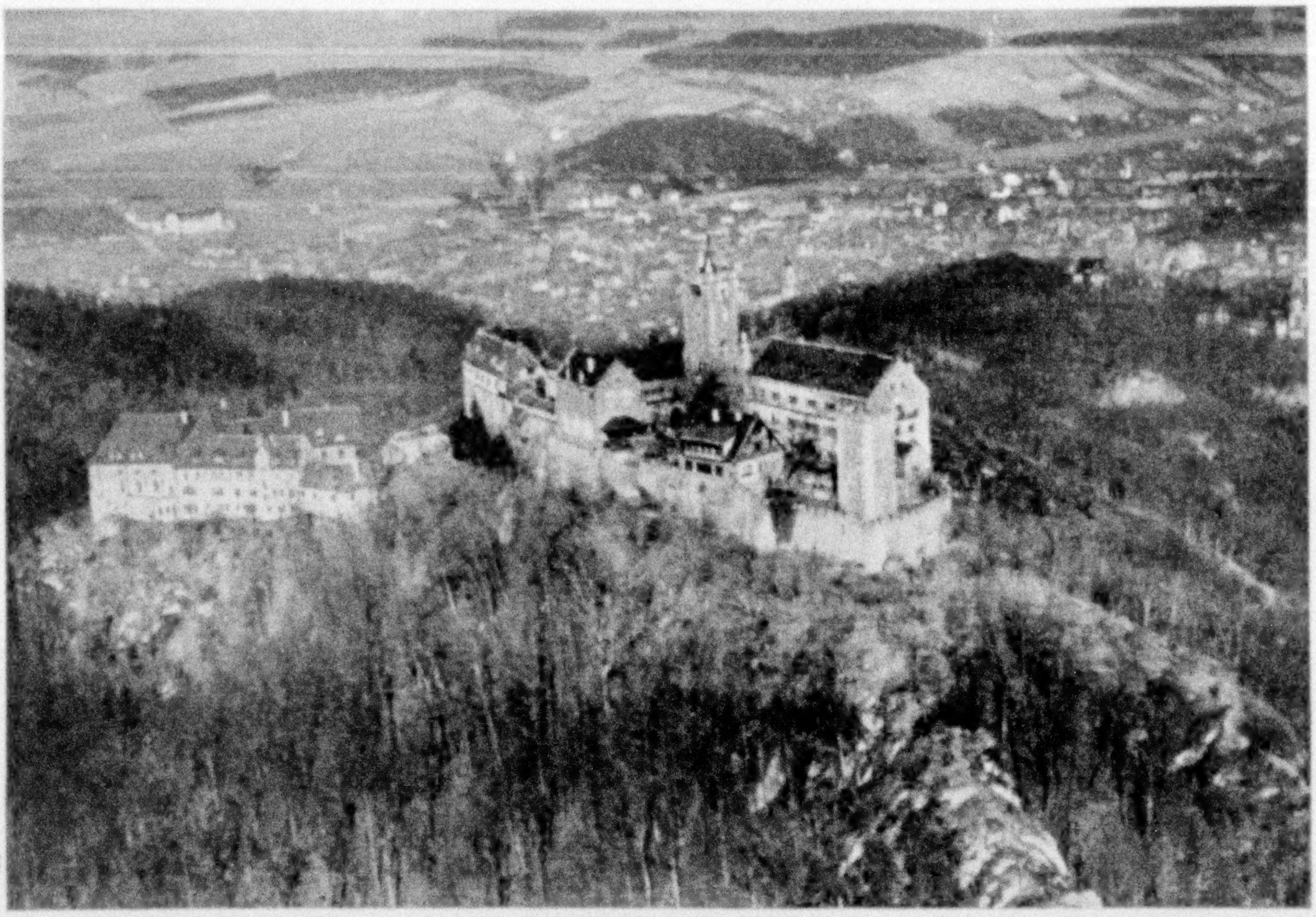
THE BEACHES, WITH THEIR STIFF BREEZES, ARE POPULAR GLIDER PRACTICE FIELDS



Photograph by Howard Siepen

ONE OF THE BEST GLIDERS DEVELOPED IN GERMANY

In the *Stuttgart* type, which has a span of 47½ feet, the opening through which the pilot's head peeps out when in flight is so small that the fuselage must be opened at the side for him to get in.



Photograph by Howard Siepen

THE WARTBURG, A FAMOUS CASTLE OVERLOOKING EISENACH

Nehring almost reached this town, flying without an engine from the Wasserkuppe, but landed 9 miles from it, after having flown more than 44 miles (see text, page 777). Herr Nehring hopes to complete the 100 kilometers (62 miles) this year.

on the starting ground rapidly became smaller and smaller. A last farewell turn and I headed off in the direction of the High Rhön.

"The feeble upward wind currents I met there were by no means what I had expected. They should have been far more powerful. The Auersberg left me completely in the lurch. When the wind blows there with too much force, it does not rush up the slope, but passes around the mountain to the left and to the right of it. Only with great effort I reached the Engelsberg, a little more than a mile away. In this manner I fought my way from mountain top to mountain top.

"Conditions in the air began to change now. Small oval-shaped cloud patches scurrying high above me dragged their shadows swiftly along the ground. Suddenly the machine began to shake, balk, and tumble—to the right, then to the left. With a jerk it flew upward. Now the clouds grew thicker, a sure sign that the wind was rising.

"The thought flashed across my mind: 'A wall of gusts—an invasion of cold air. Cold air approaching from the west causing the warm air before it to rise.' I hoped I might stay at least a little while in this upward current. So, pointing my machine at a slight angle to the direction of the wind, I let myself drift to the north. I flew six miles like that without losing height.

"Now and again gusts would tear at my bird. Occasionally the needle of my speedometer would fly around like mad, indicating a tremendous speed. I began to doubt whether my wings could stand this strain for very long. Uneasy, I glanced to right and left, at the vibrations of the wings. But they seemed to be able to hold out. Flying at an altitude of 2,500 feet, I passed a spot where I had landed a year before. Two more miles and the Rhön record would be broken!

"Below me unrolled the charming panorama of Gerstungen and the River Werra, whose east bank I had followed for the

Photograph by Alex Stöcker

A GROUP OF SAIL-PLANE ACES

From left to right: Max Kegel, who by his flight in a thunderstorm was among the first to utilize the upward wind currents of clouds (see text, page 771); Wolf Hirth, who made a sensational flight far out over the sea, between two layers of clouds, at Vauville, France (see text, page 769); Ferdinand Schulz, school-teacher in East Prussia, one of the veteran birdmen, who holds the duration record of more than 14 hours (see page 780); at the wheel, Fritz Stamer, also a veteran pilot, head of a flying school on the Wasserkuppe; Robert Kronfeld, of Vienna, assistant to Herr Stamer; Edgar Dittmar, who established the new world's altitude record of 2,542 feet (see page 780). They are sitting in front of the canteen on the Wasserkuppe.

last 12 miles. Turning above the stream, I made a mistake, for I found I had missed my upward wind current and was sinking. All attempts to improve my condition were in vain.

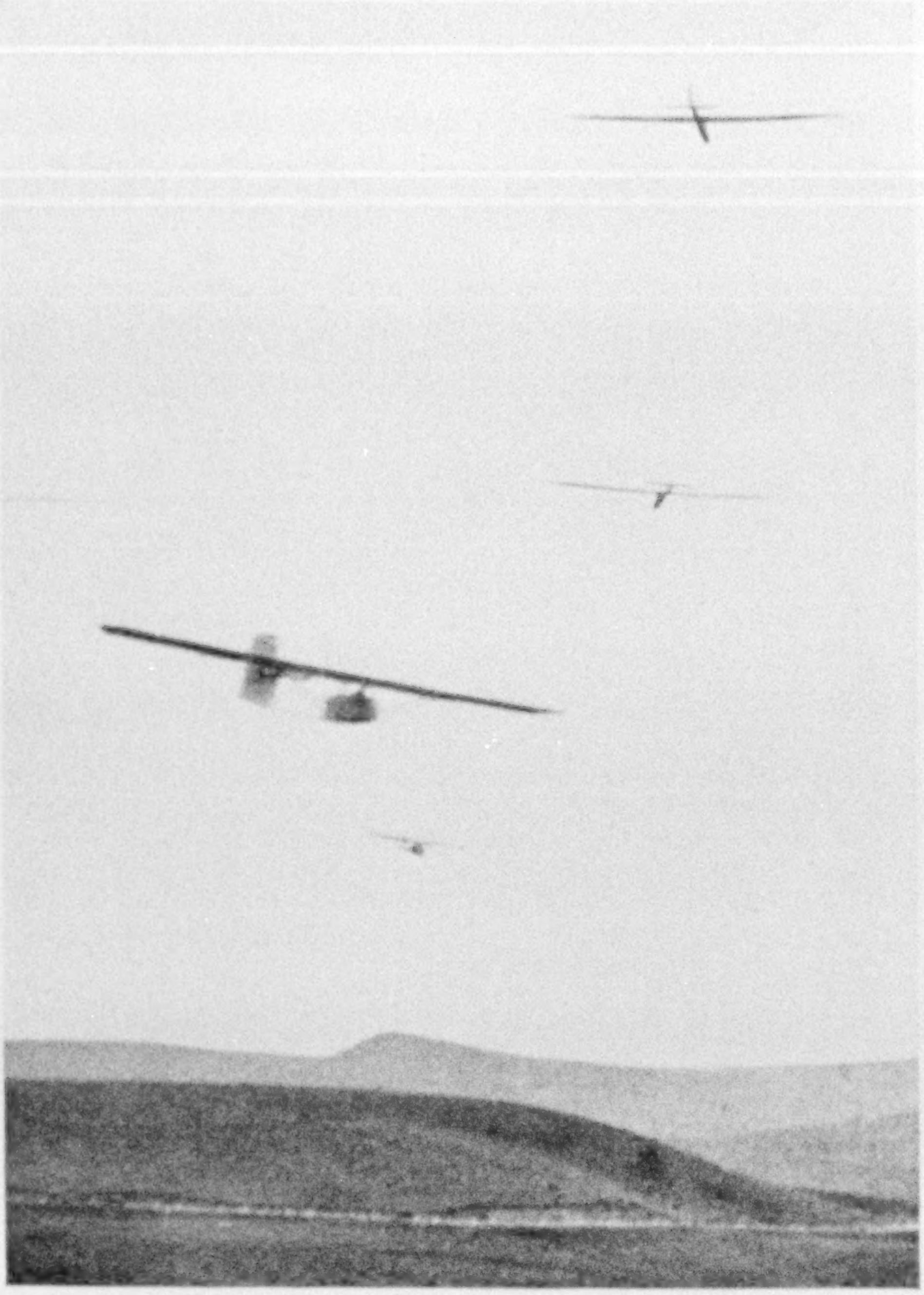
"Just then I saw what seemed my last chance for an upwind. A valley ran from north to south. I headed for it. But the wind struck its slopes at too acute an angle and I continued to sink. Then a gust of wind threw me 75 or 100 feet up again. It was a tight place!

REMARKABLE ADVANCES IN SIX YEARS

"Only 60 feet above ground I tried to turn around, in order to land against the wind. While barely skimming above a field, another gust threw me fully 100 feet up into the air. Such are the surprises of air gliding. I covered another mile; then turned around again and landed smoothly on a field. The first thing I did was to get out my map. I had flown close to 45 miles."

When one compares the feats of these birdmen with the feeble glider hops of only five or six years ago, the rapid progress made in motorless flying becomes apparent. It is strange that this branch of aviation, which is so much older than engine flying and which, in fact, originally prepared the ground for the latter, should have been neglected for so long. Perhaps it is explained by the fact that man, having evolved a power plane from his first crude glider, naturally came to regard the latter as a phase of aviation infancy from which he had emerged. But, although he professed to be copying the bird, what he really built was a flying engine.

In the history of motorless flying there have been two stages of development. The first commenced with Otto Lilien-



Photograph by Howard Siepen

SAIL PLANES IN FLIGHT

It is rarely possible for a photographer to get so many swift birds in one picture, quite apart from the fact that such mass flying is an exceptional occurrence. For more than an hour six of these engineless sail planes flew in a wide circle. The swifter and more sensitive ones would chase each other, or one would suddenly dart off across the valley and, making a graceful curve, would come sweeping back to join the others again. The plane in the foreground was of a more sturdy type, and when it passed by one could hear the creaking of its struts and spars.

thal's glides of 600 feet, near Berlin, in 1894, and ended with the glides of the Wright Brothers, who flew six years later at Kitty Hawk, North Carolina.

The second stage of development commenced with the first motorless airplane competition in the Rhön Mountains in 1920. During the intervening twenty years not much attention had been paid to gliding. The only outstanding accomplishment was Orville Wright's flight in 1911, lasting 9 minutes and 45 seconds. This was the first real sail-flight ever performed; but it was not undertaken for that purpose. Wright merely wanted to try out a new stabilizer. Most of the time he hovered with his biplane glider over one spot.

Germany's special interest in motorless flying has been attributed in part to the fact that under the original provisions of the Versailles Treaty certain restrictions were placed upon the nation's aircraft development; so that her air-minded students perforce turned to the study and development of engineless flight.

The first motorless flying in the Rhön was more of a gliding than a sail-flight experiment. Nevertheless, the record of 2,700 feet, established in 1912 by Gutermuth, was improved to more than 6,000 feet by Wolfgang Klemperer. He remained aloft about two minutes and 22 seconds.

The next competition followed in 1921. In it Klemperer made the first cross-country glide to an agreed destination. He started definitely for Gersfeld, a village in the valley about three miles distant. He actually landed there in 13 minutes, thus first proving that a glider could be controlled by its pilot. Later, Arthur Martens remained aloft for 15 minutes, covering five miles across country. Soon afterward Harth flew for nearly 22 minutes.

By then such flights were beginning to attract the attention of other countries.

One of the participants in the glider meet in 1923 was the Dutch airplane constructor, Fokker. During this competition the first motorless flight of one hour was performed by Martens and the first motorless flight with pilot carrying a passenger was made by Fokker.

Fokker arrived at the competition with two motorless biplanes. The measurements of these, it was said, he had wirelessed to his factory from aboard ship on a return voyage from the United States. His factory-built, engineless airplane was a sensation in those days, when Espenlaub, a carpenter's apprentice, had spent a whole lonely winter on the Wasserkuppe building his bird, and when the school-teacher, Ferdinand Schulz, flew a machine which bore all the earmarks of depleted funds. Yet these crude, homemade machines flew well.

When Fokker came to the 1923 meet he brought his motor car with him and made other competitors his lifelong friends by towing their gliders uphill, back to the place of take-off. In those days one could reach the Wasserkuppe only on foot, across meadows and up steep inclines. But soon enthusiasts came and formed a happy family, congratulating one another on every additional ten minutes a plane stayed in air. Where once only a few primitive sheds and a ramshackle inn sheltered the flyers, to-day there is a fine road leading up to the hilltop, spectators arrive in chars-à-bancs, and two hotels provide for their comfort.

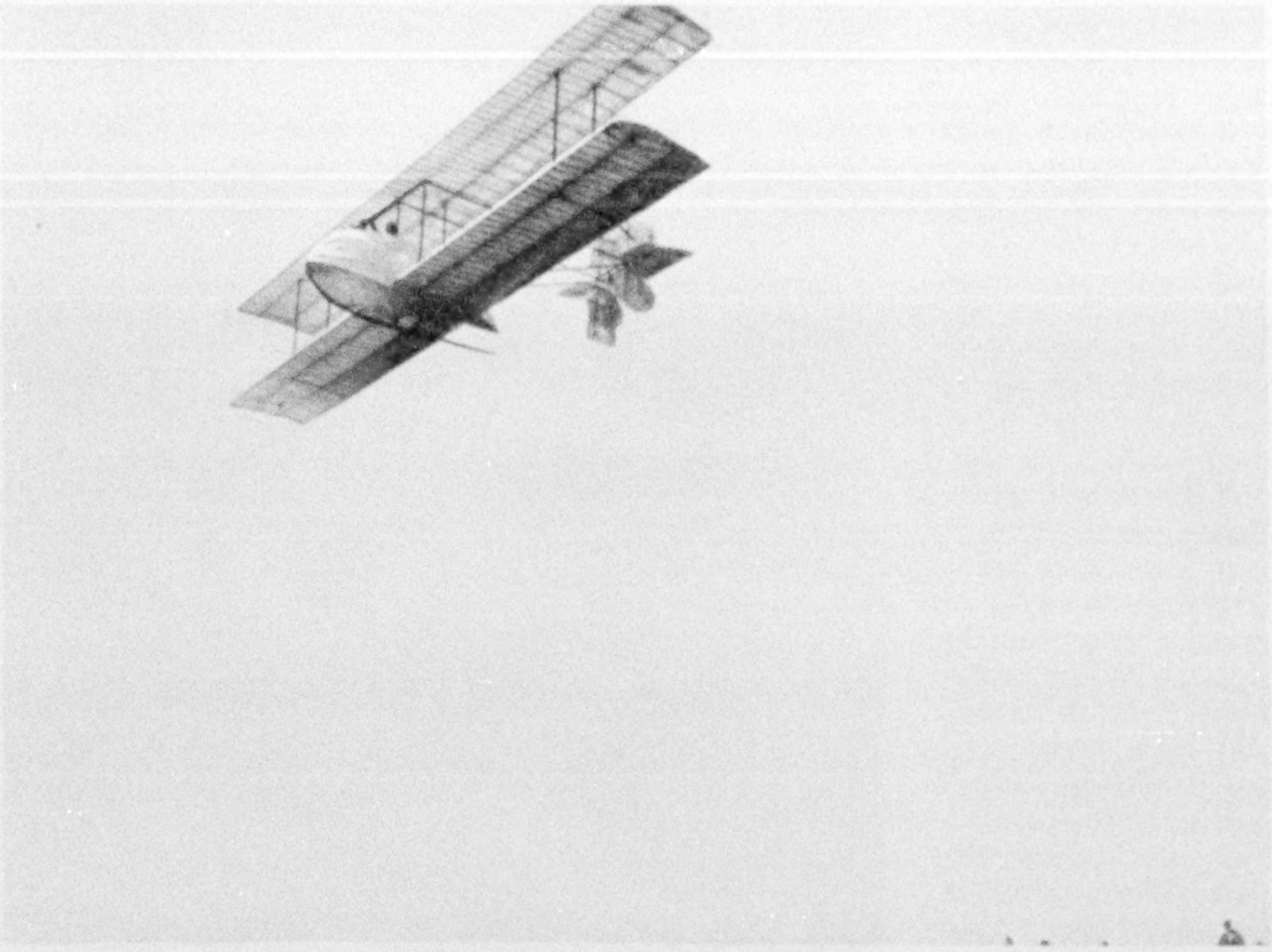
Photograph by Howard Siepen

WOMAN NOW SHARES WITH MAN THE ADVENTURES OF THE AIR

This girl is taking gliding lessons at a town near Berlin. She is buckled in her seat with a safety belt and above her head hangs a sort of street-car straphanger's device, which she may grasp with her left hand to steady herself when landing.

The first passenger flight, after a few trial hops, lasted 13 minutes; the present world's record for a flight with one passenger, held by Ferdinand Schulz, is 9 hours and 21 minutes. He flew with Heinz Reichardt like a shuttlecock between Rossitten and Pillkoppen, two villages on the coast of East Prussia.

Conversation in a glider can be carried on as normally as in a room, owing to the absence of engine noise. The suggestion has been made, in fact, that on long flights the passenger should read aloud to the pilot.



Photograph by Howard Siepen

THIS ODD, MOTORLESS BIPLANE WAS DESIGNED BY ANTHONY H. G. FOKKER, DUTCH AËRONAUT

Entered in the glider competition in Germany in 1923, Fokker flew this craft himself. He is shown here carrying a passenger (see text, page 779).

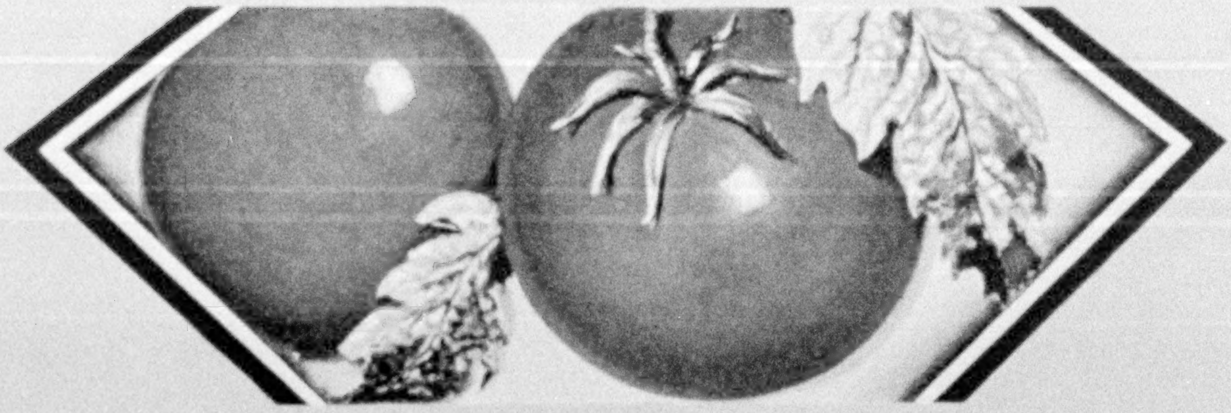
During Germany's experiments with gliders other countries began to show an interest in this activity, but nowhere else has it been so developed.

The first competition for gliders outside of Germany took place in the spring of 1922, in Gstad, Switzerland. A French meet followed at Clermont Ferrand, in August of the same year. Then the English discovered a territory suitable for sail-flying in Ilford Hill. It was there that the Frenchman, Maneyrol, wrested from the Germans the then world's duration record by flying 3 hours and 21 minutes. This record was soon more than doubled by two other Frenchmen, Thoret and Barbot. Later, Massaux, a Belgian, forced the record up to 10 hours and 29 minutes.

On October 2, 1925, Ferdinand Schulz, a German, flew for the first time once around the clock, staying up 12 hours and 6 minutes, when participating in the engineless airplane competition on the Crimean Peninsula. On May 3, 1927, at Rossitten, East Prussia, he increased his time to 14 hours 7 minutes.

For many years after the early experiments of the Wrights, Chanute, Herring, and Lilienthal, little attention was paid to gliding in the United States. Lately, however, interest is again revived. In 1928 a few German gliding men visited the United States at the invitation of certain Americans interested in motorless flying, and at Corn Hill, near Truro, on Cape Cod, a few practice glides and soaring flights were made. On the morning of July 29 Peter Hesselbach, one of the German visitors, flying his Darmstadt glider, soared back and forth along the shores of Cape Cod, remaining aloft for four hours and five minutes.

Germans for years have practically monopolized the sport of long-distance gliding; and Edgar Dittmar, a German, now holds the world's altitude record of more than 2,500 feet over the starting point. That so many records should be held at present by Germans shows to what extent engineless flying has developed in that country.



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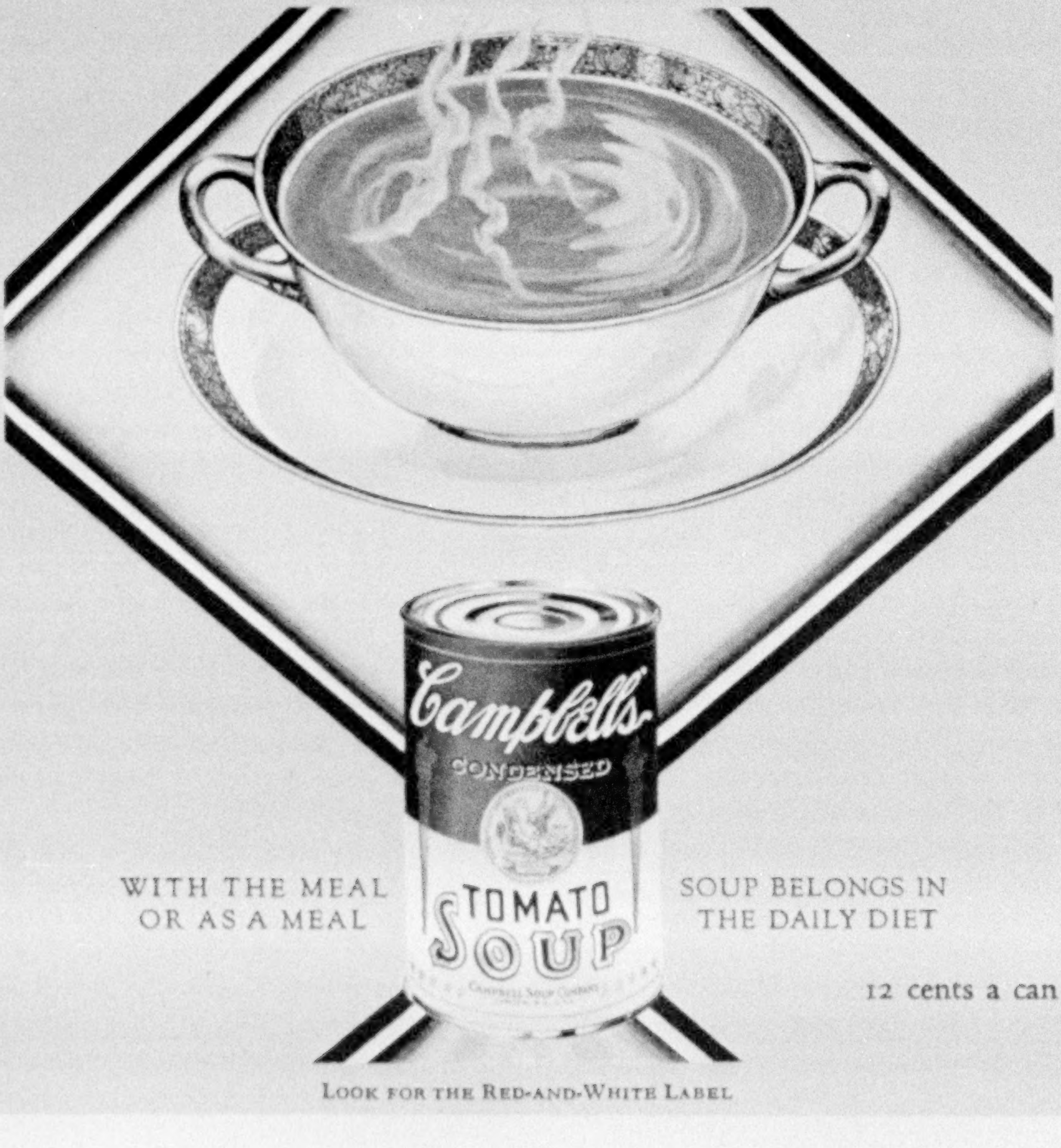

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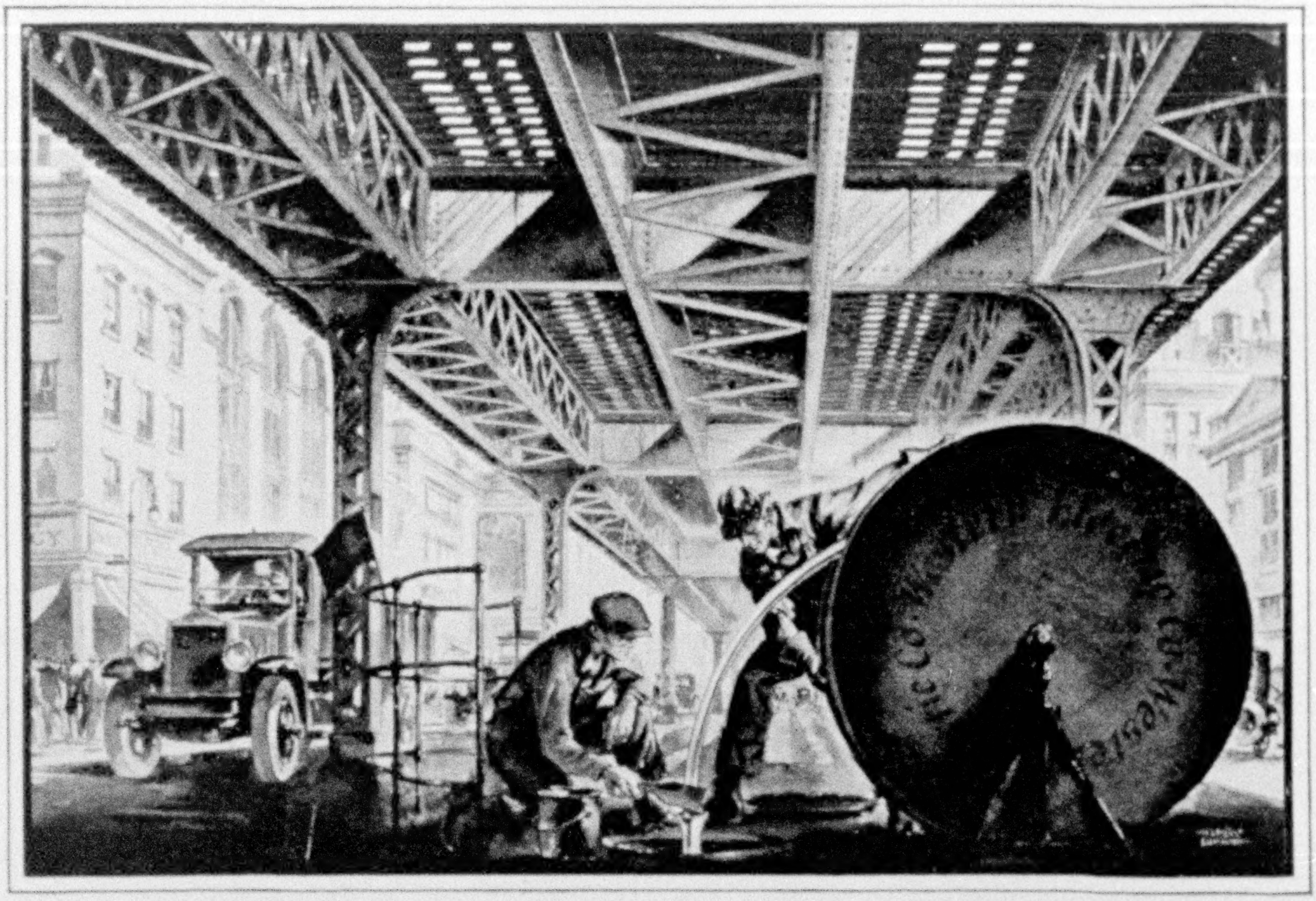

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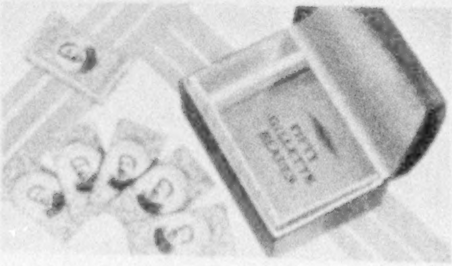

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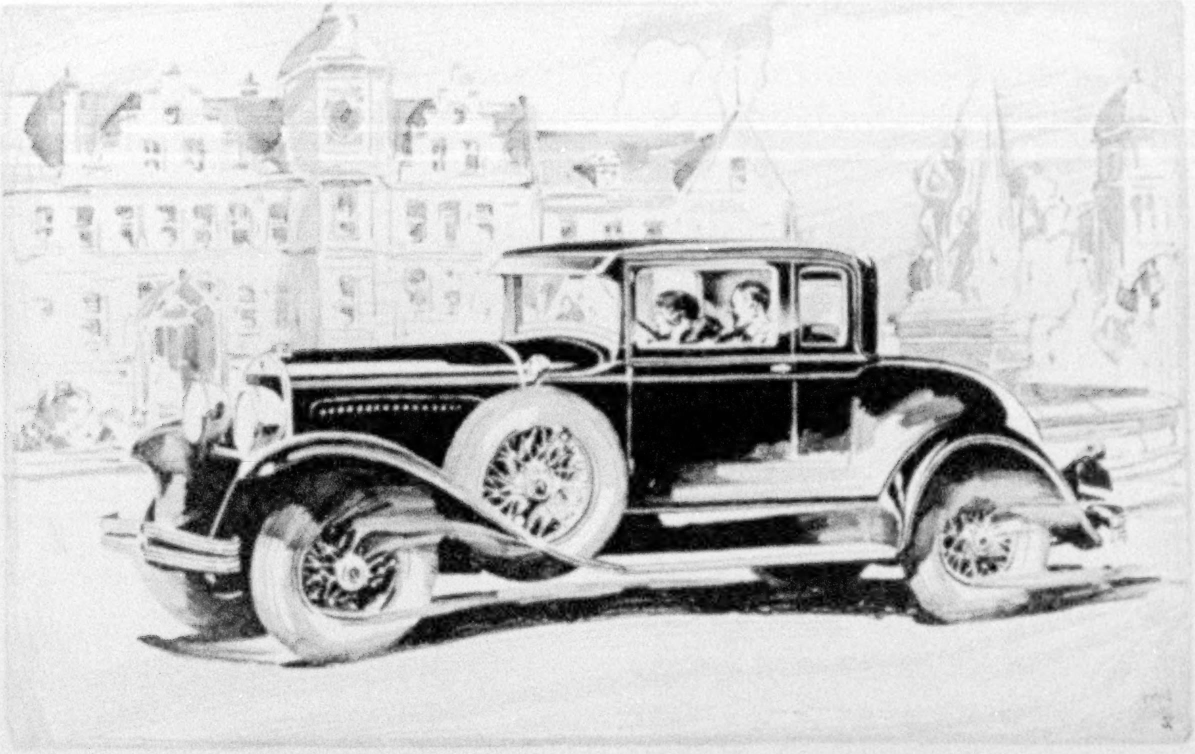

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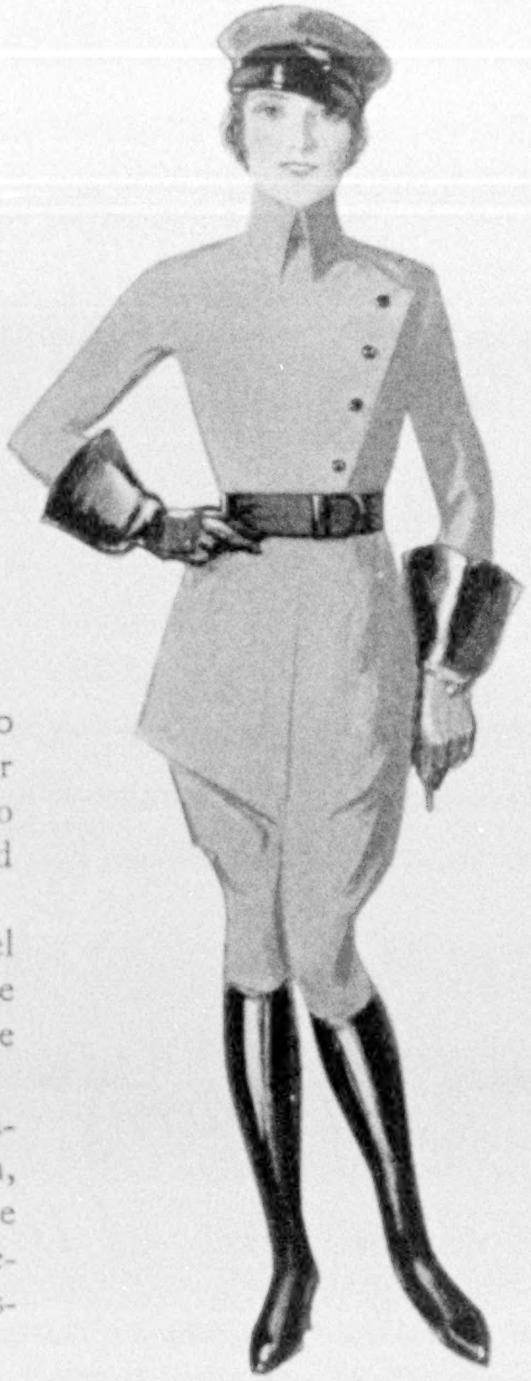

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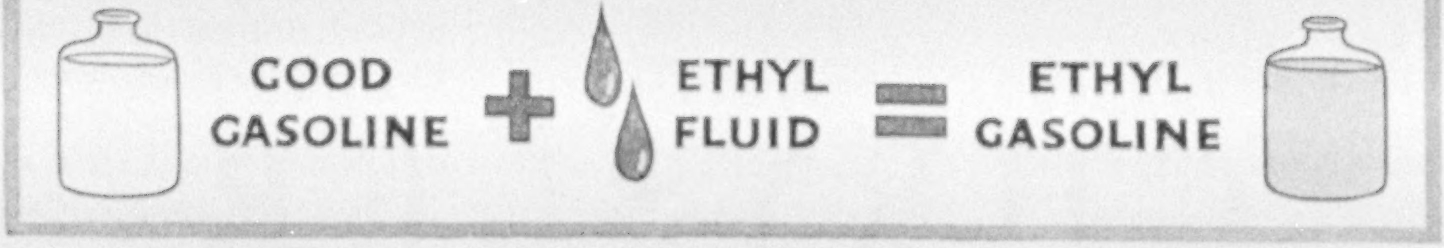

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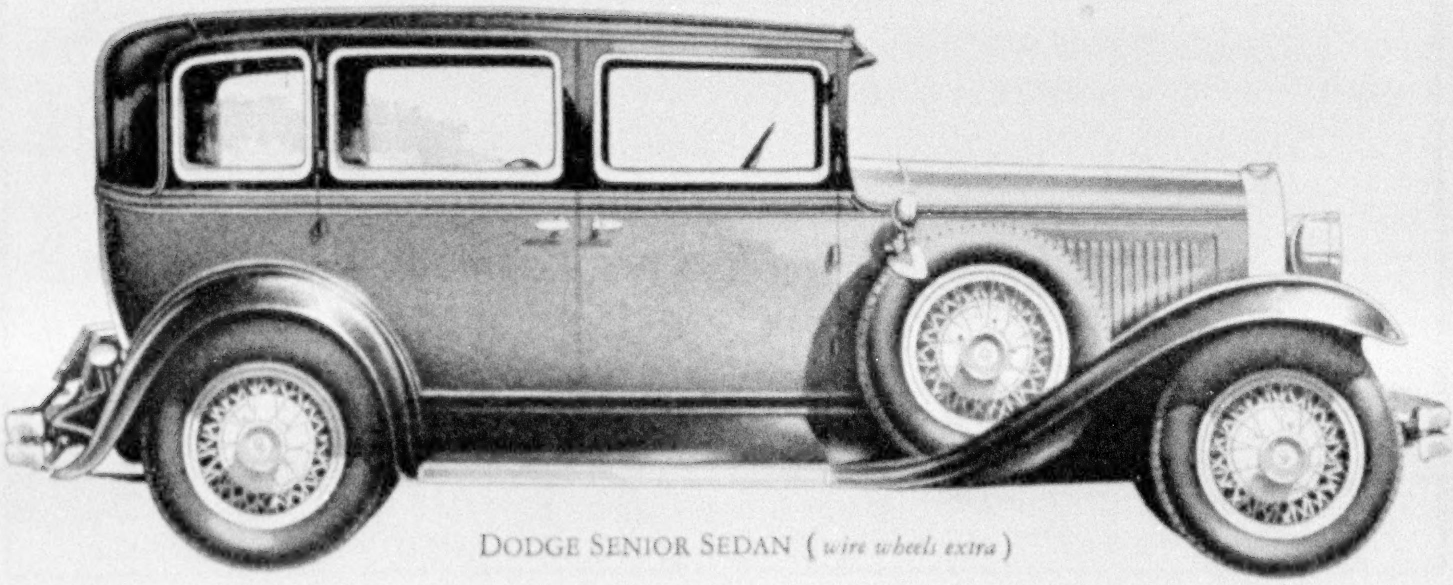

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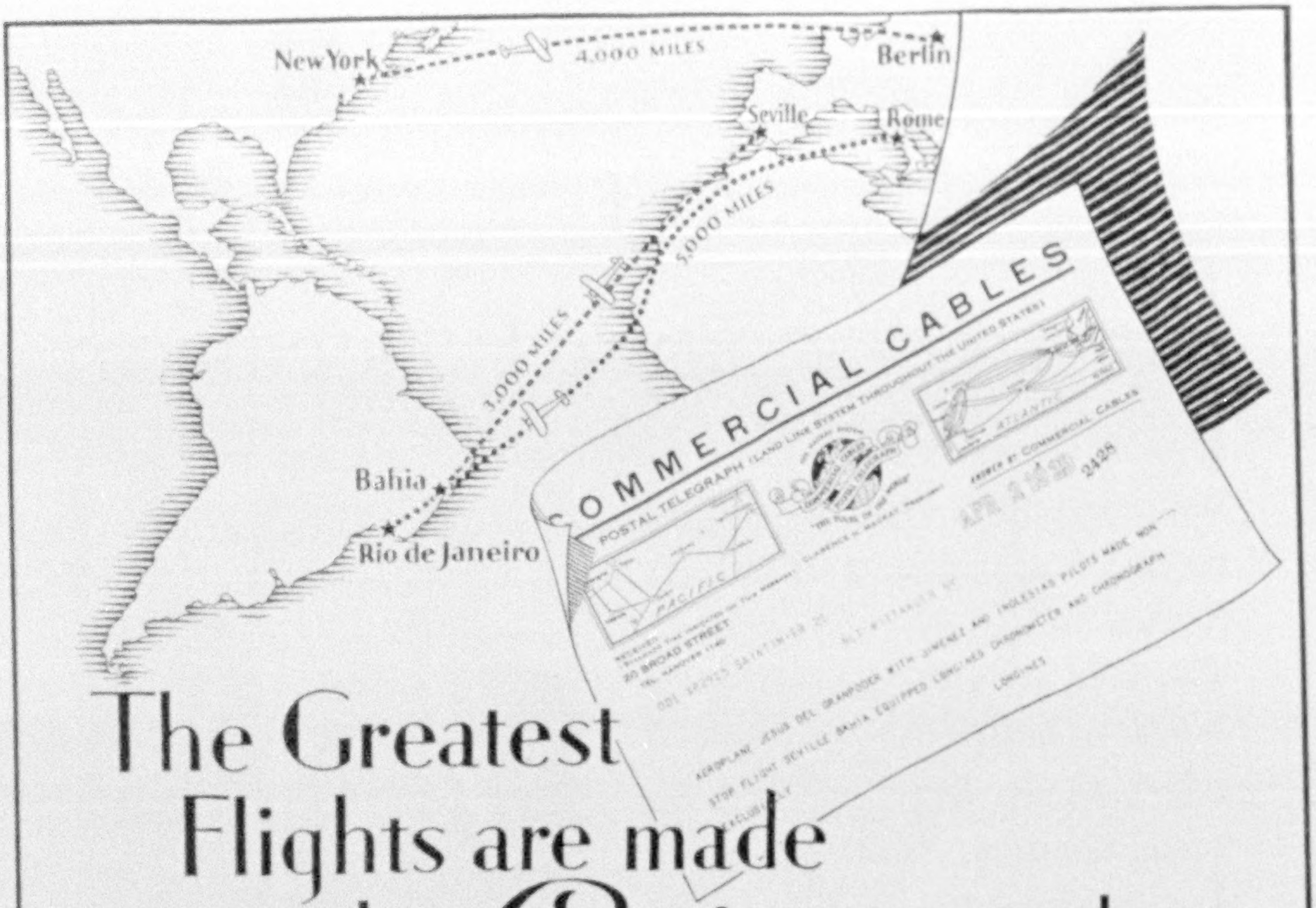

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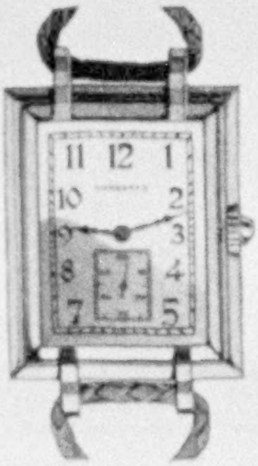

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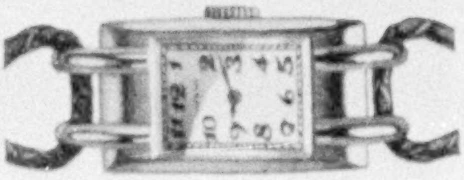

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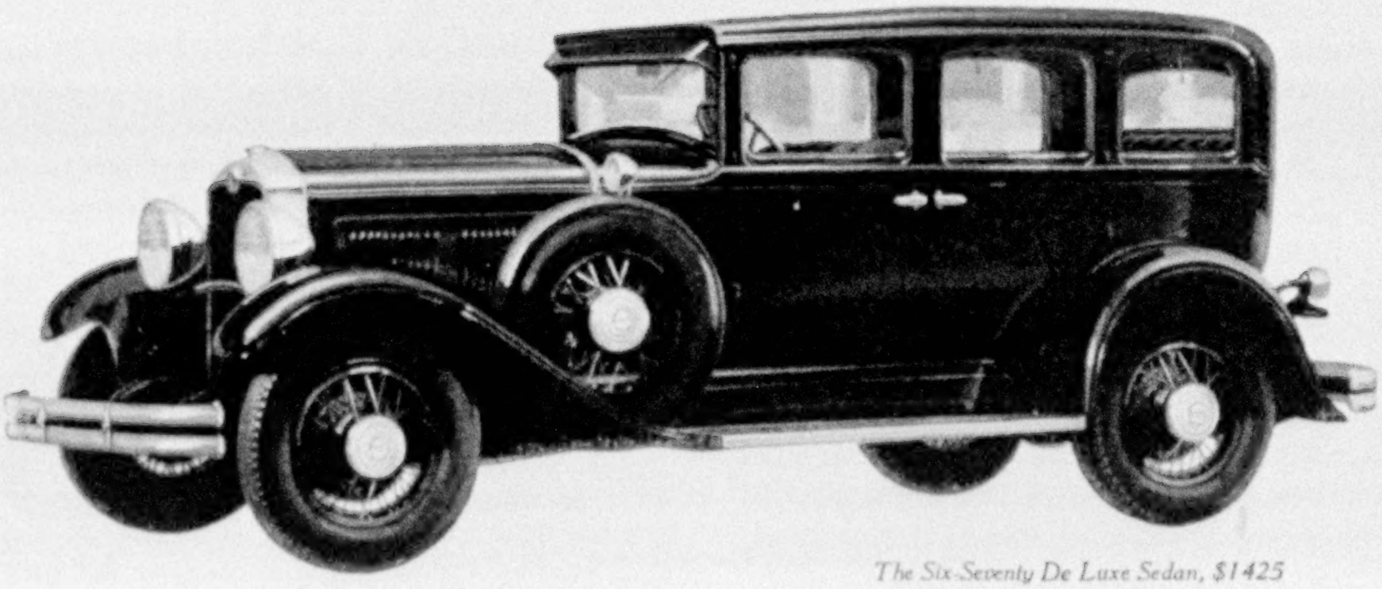

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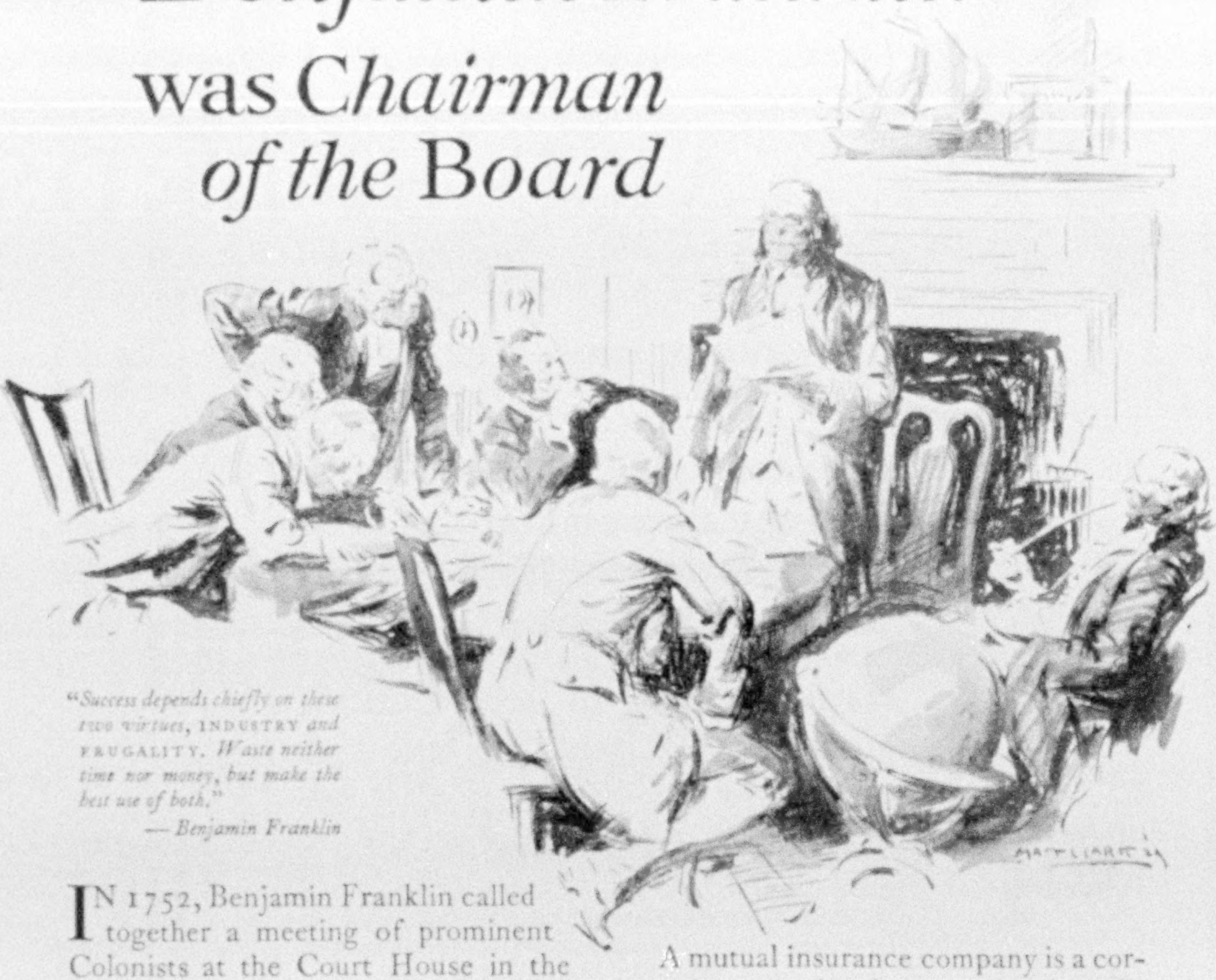

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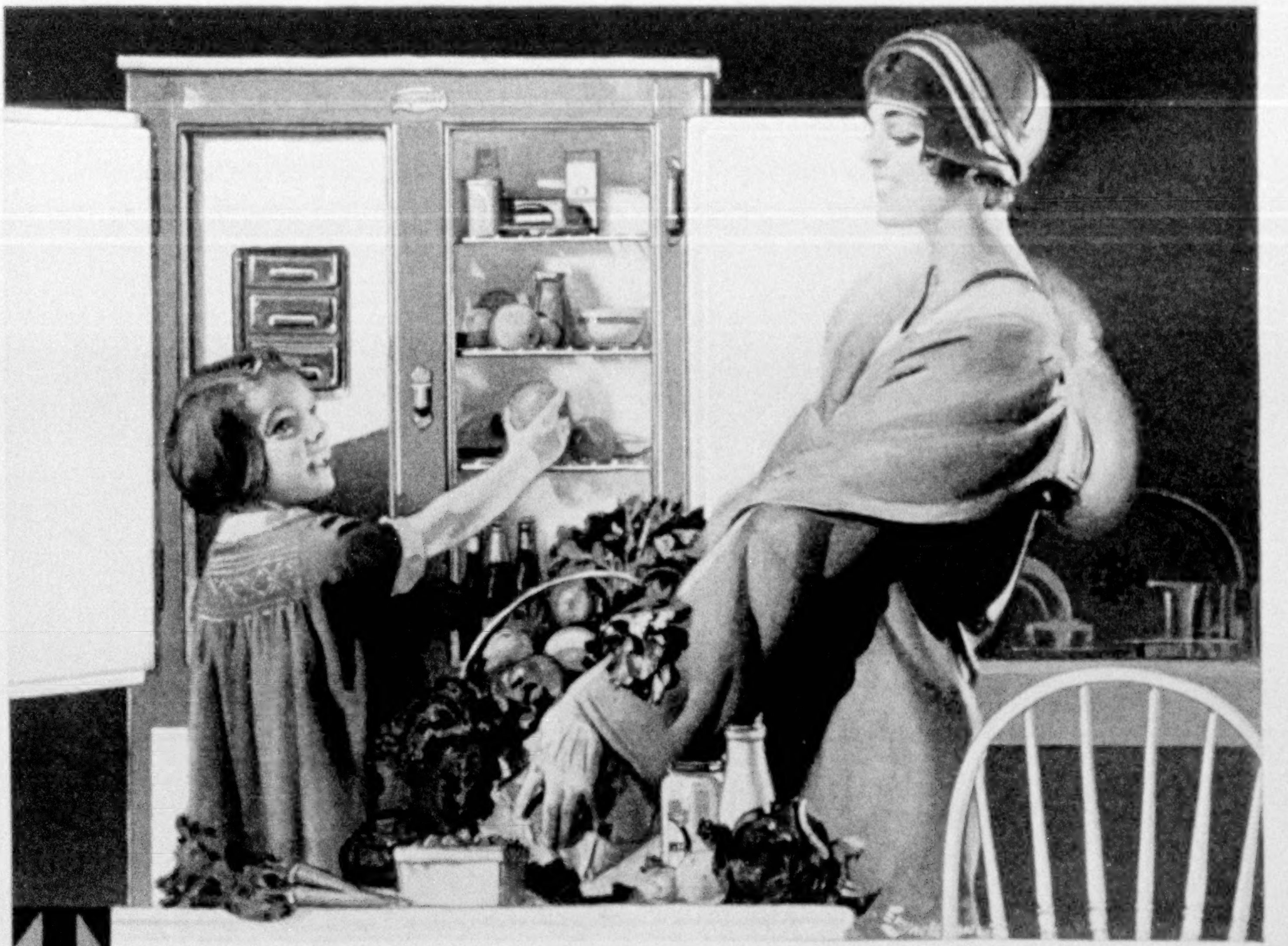

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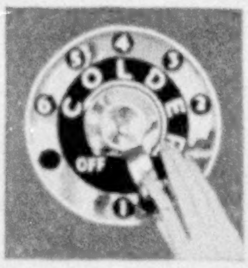

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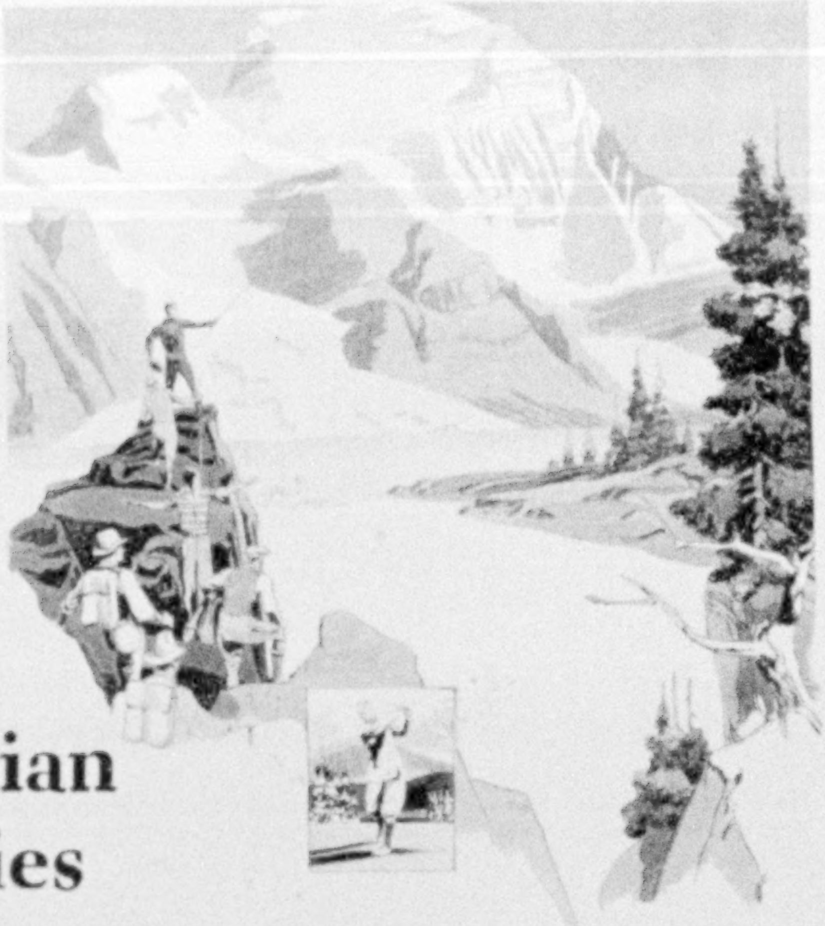

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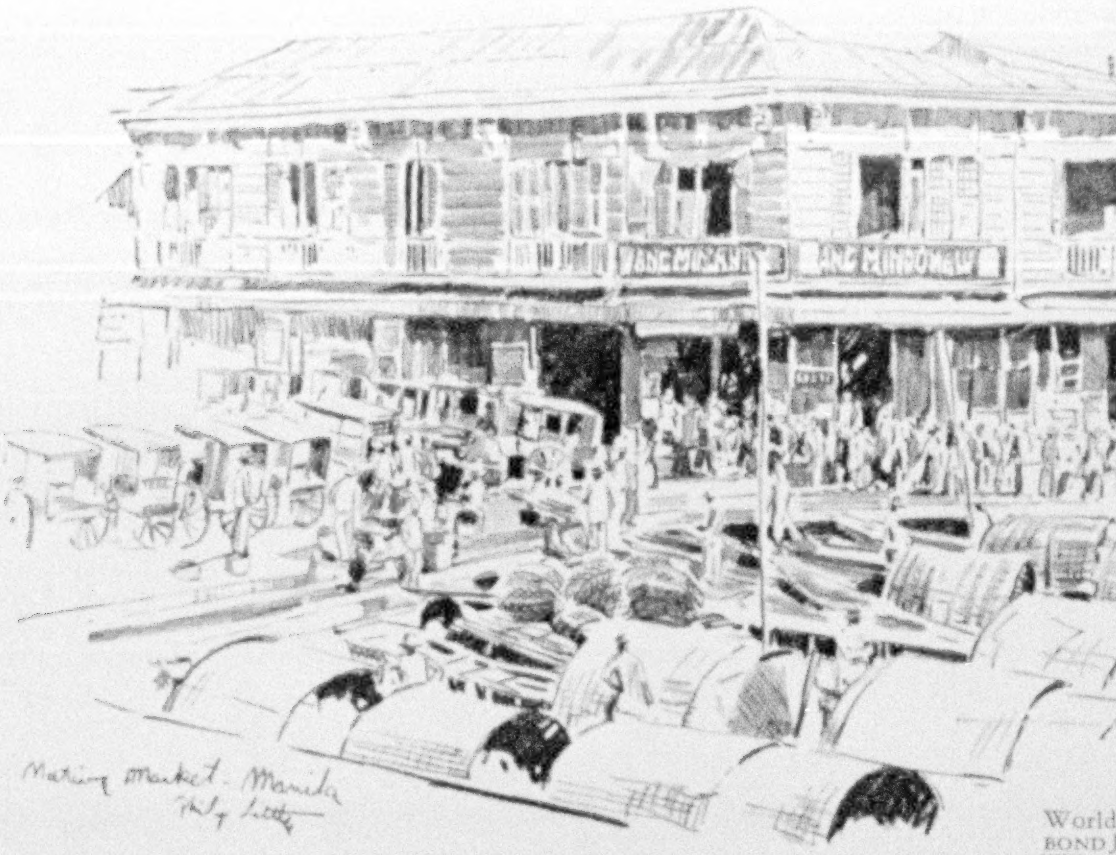

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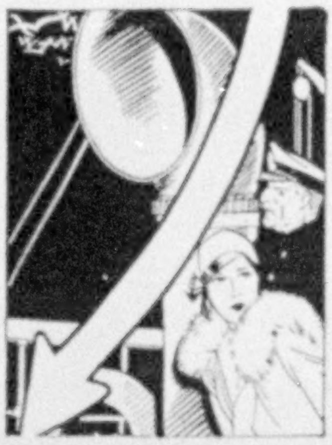

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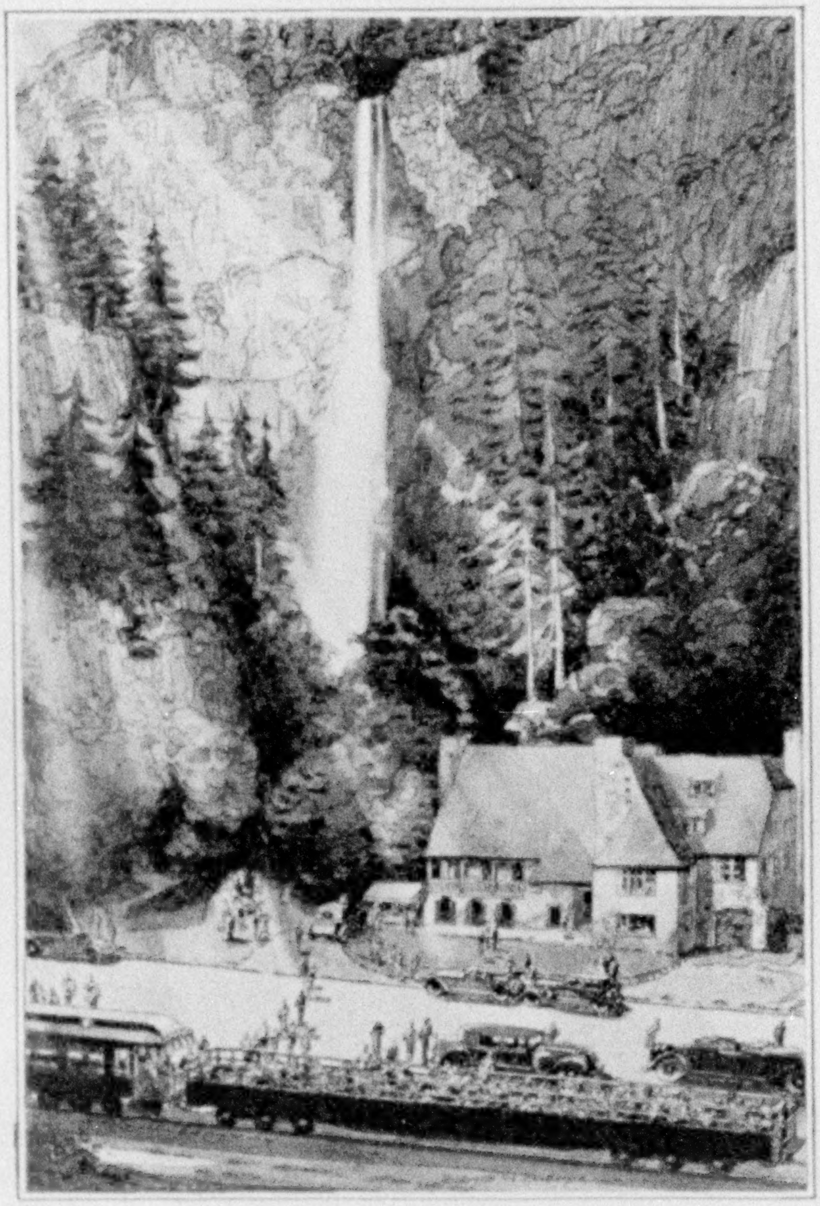

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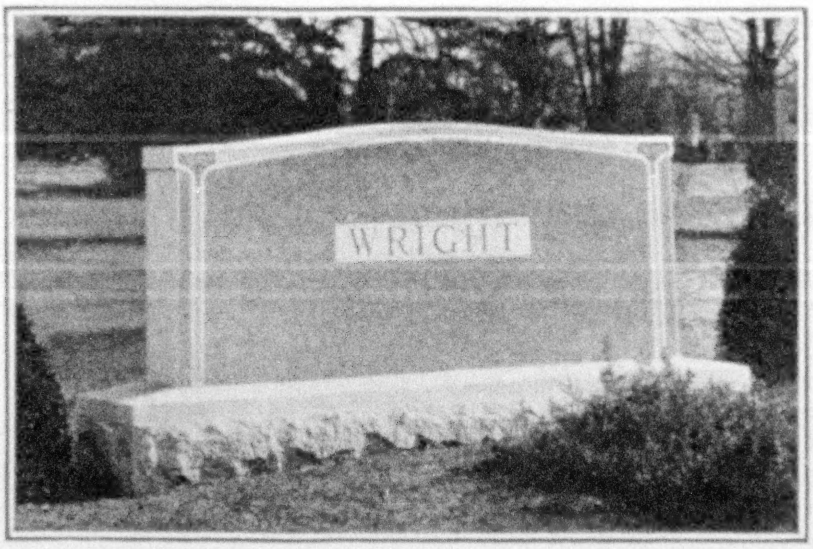

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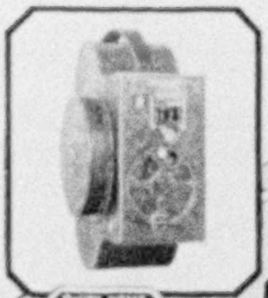

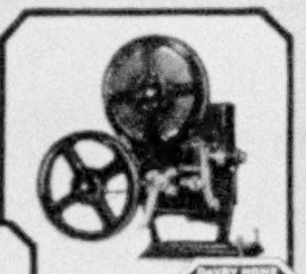

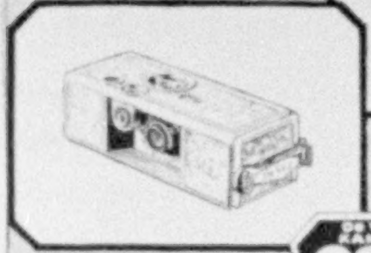

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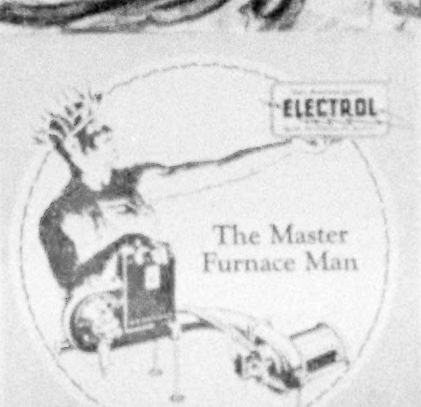

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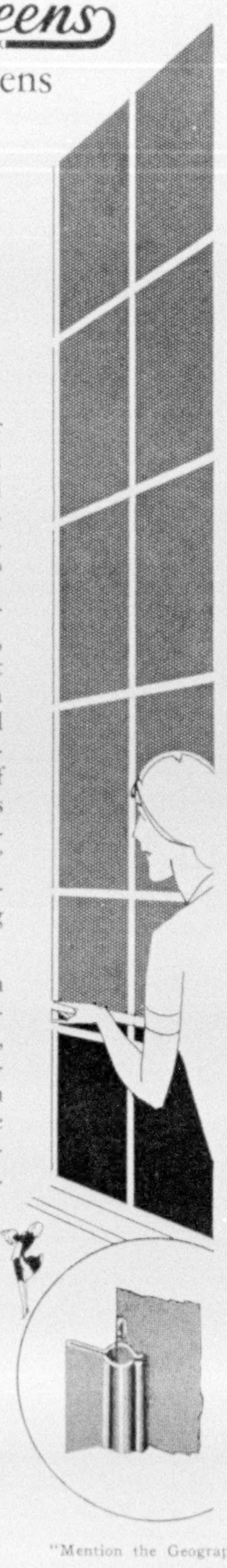

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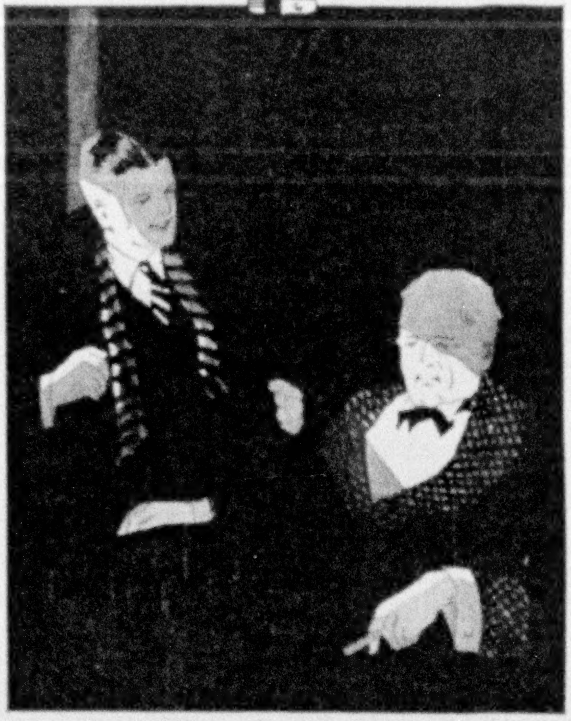

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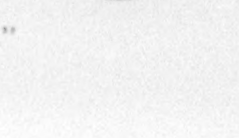

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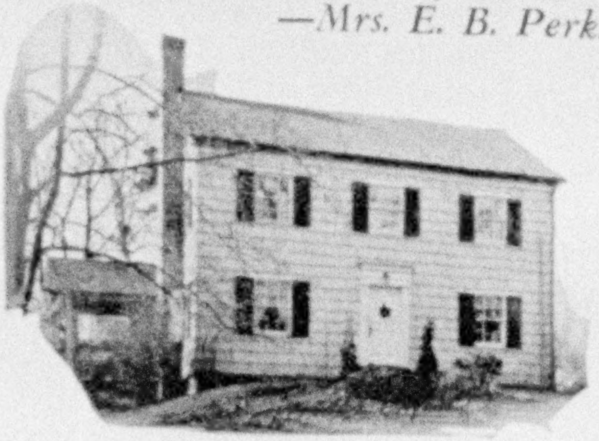

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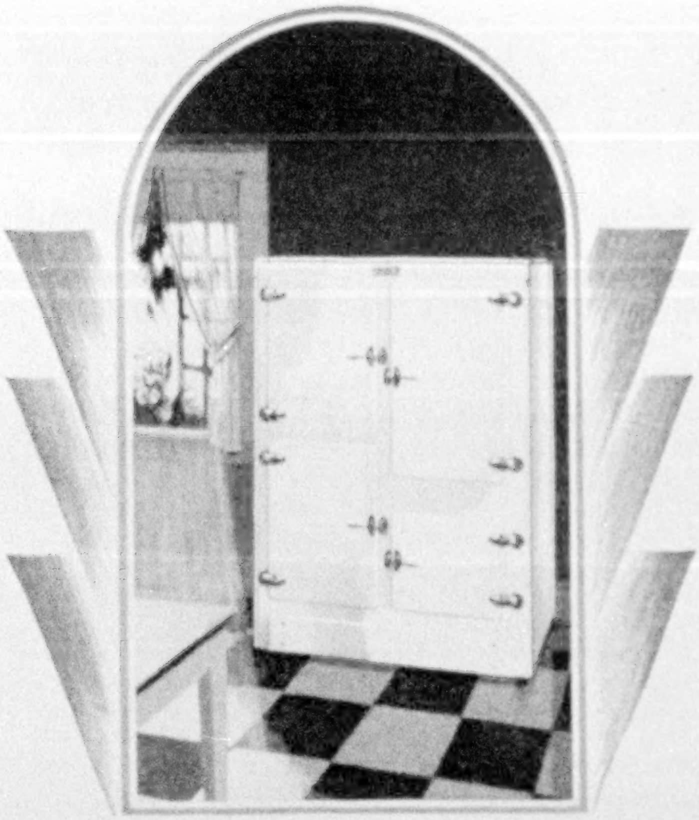

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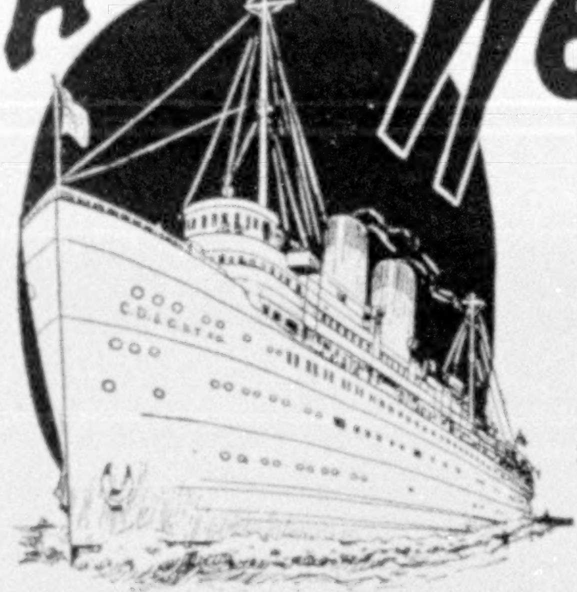

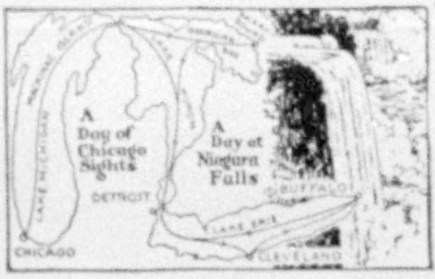

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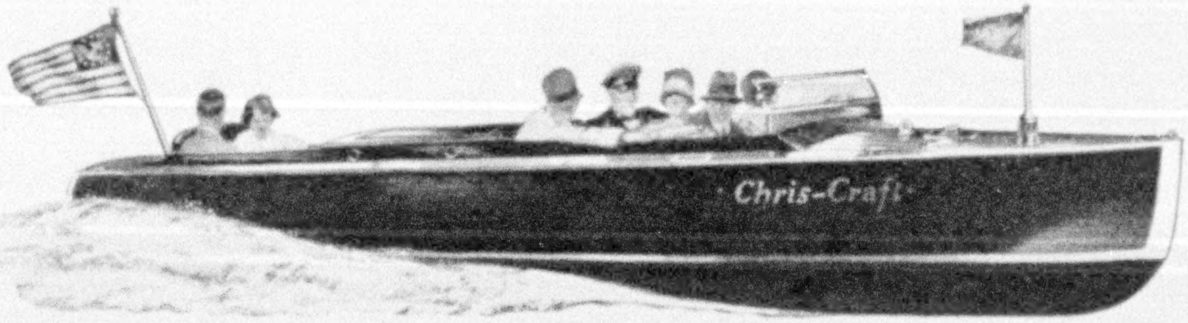

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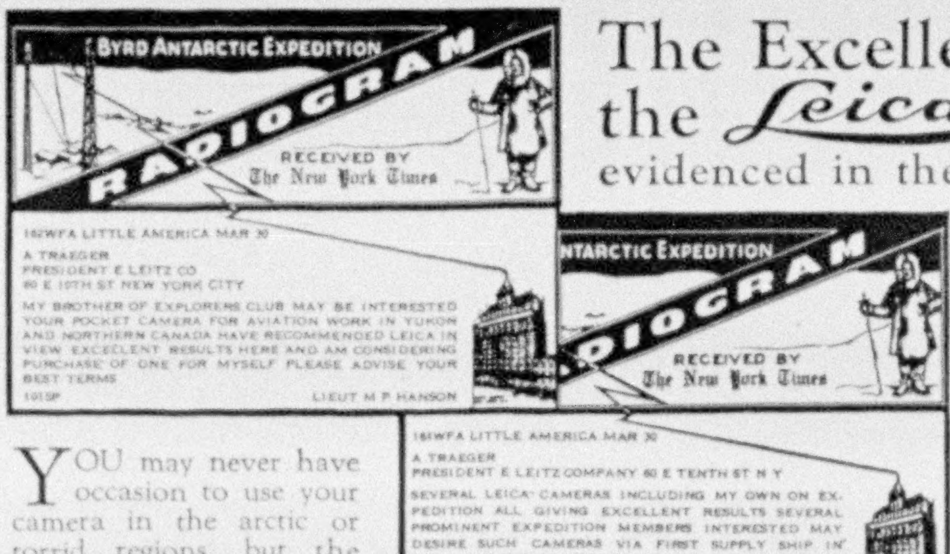
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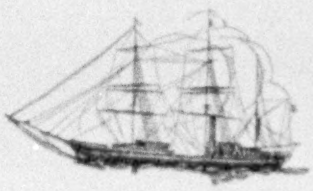

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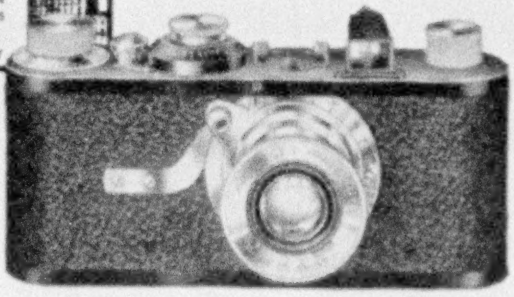

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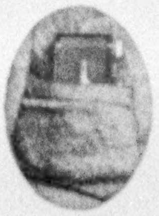

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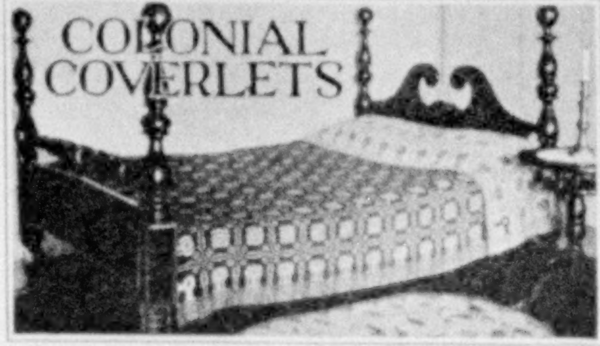

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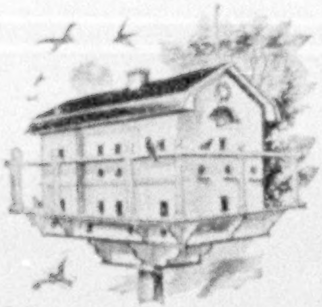

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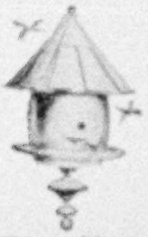

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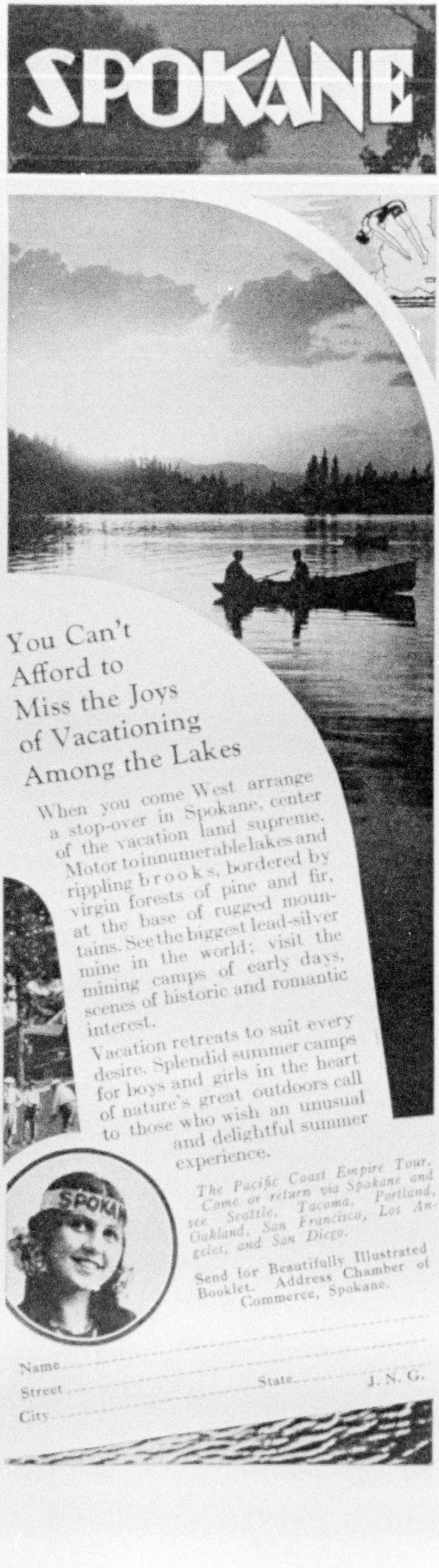

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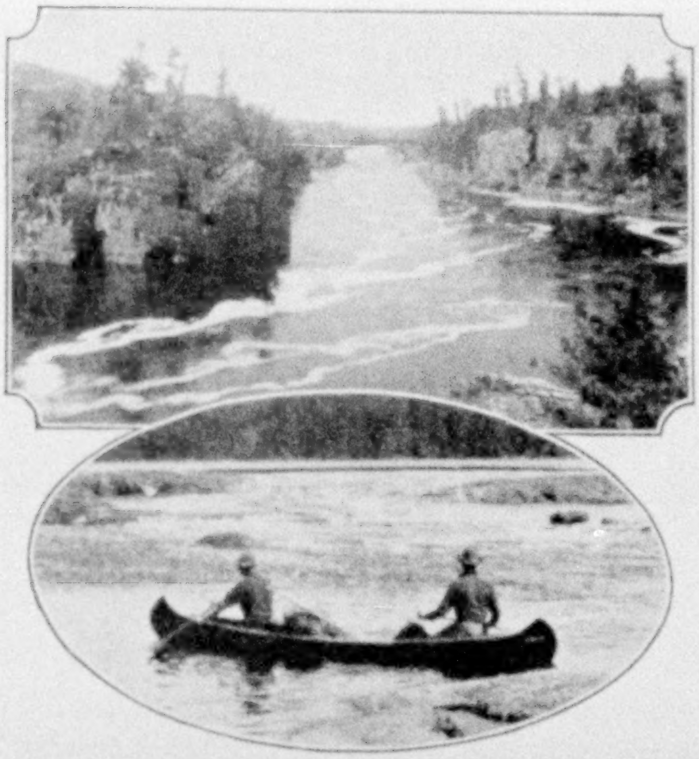

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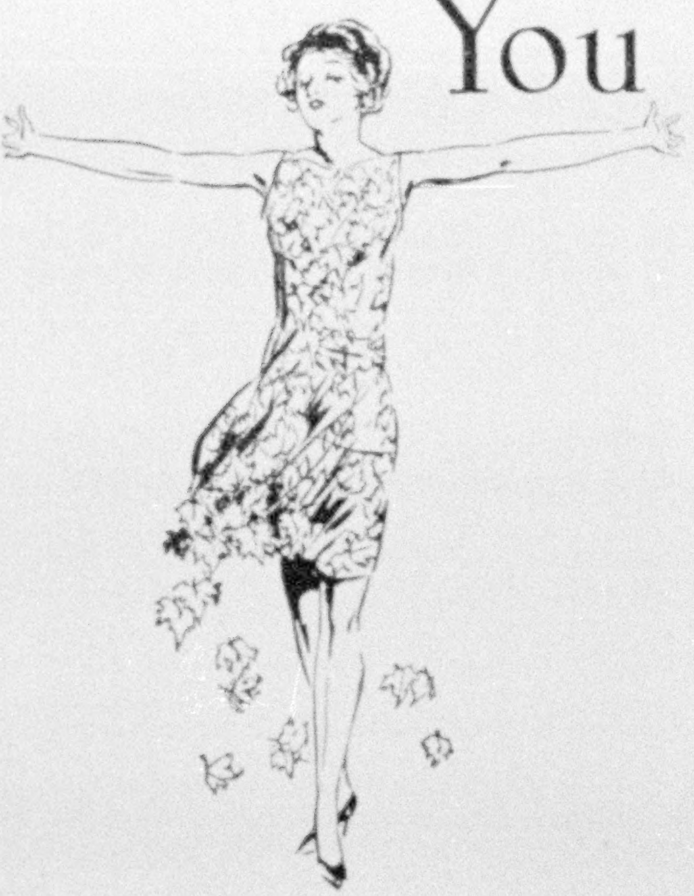

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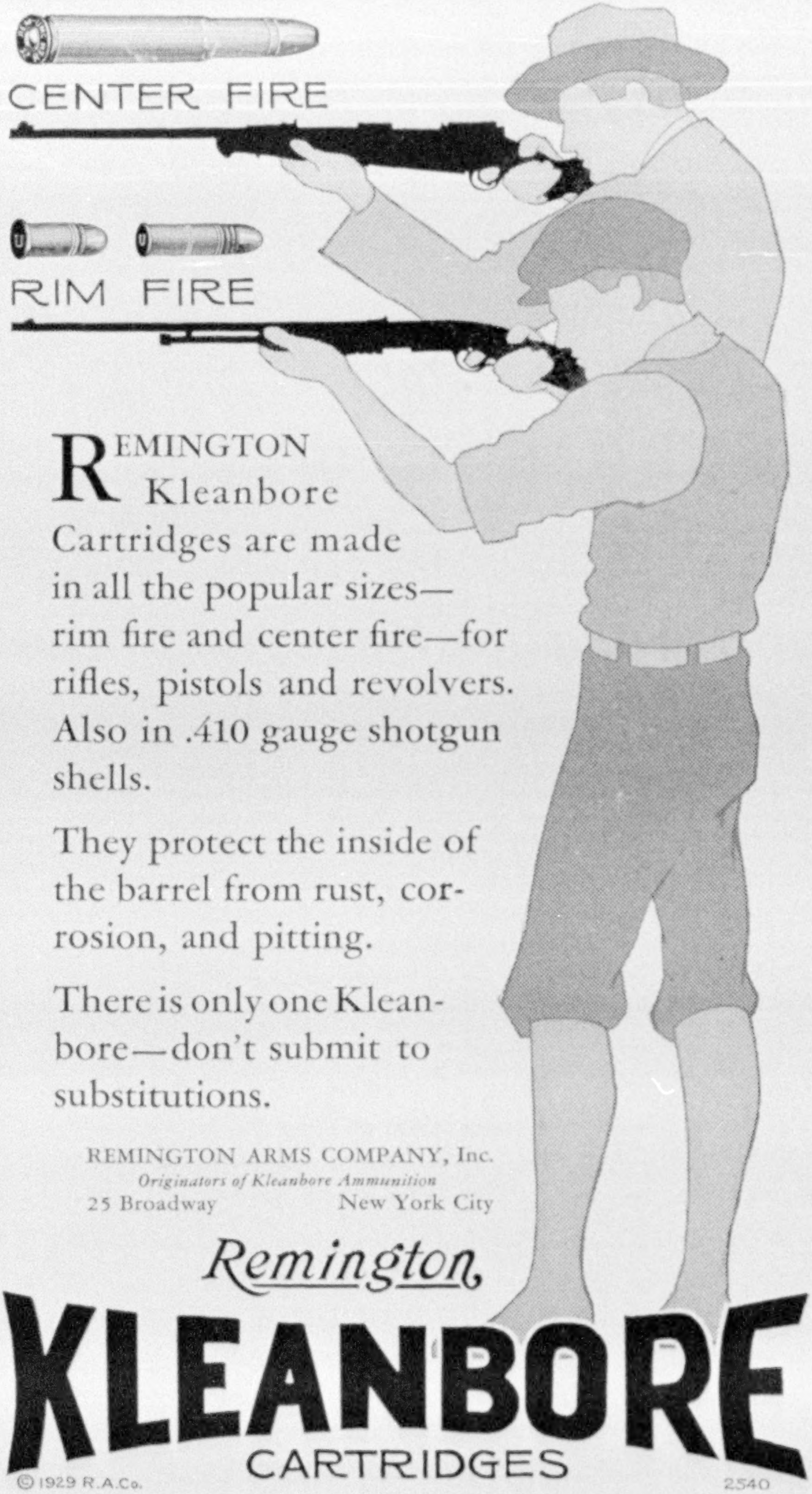

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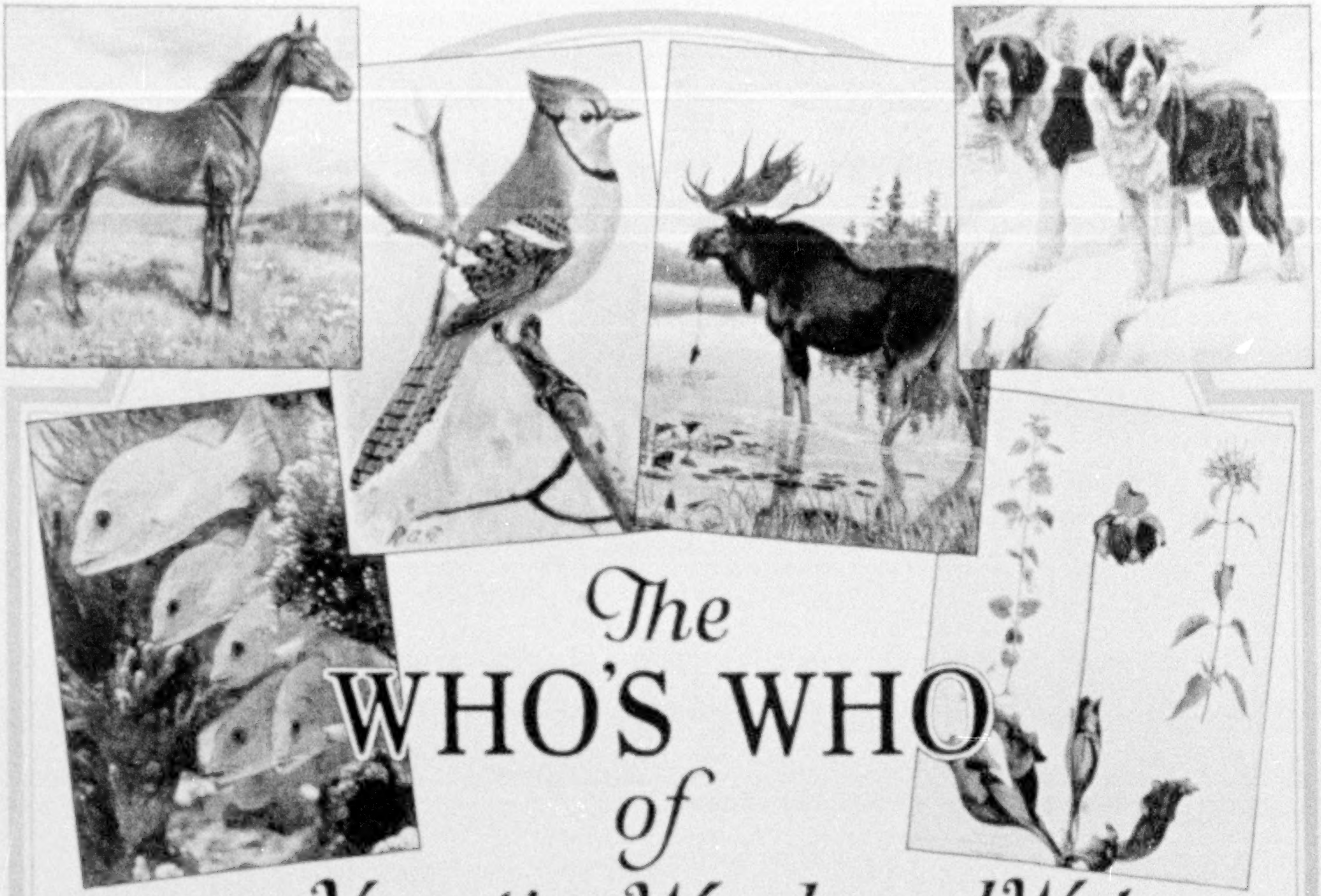

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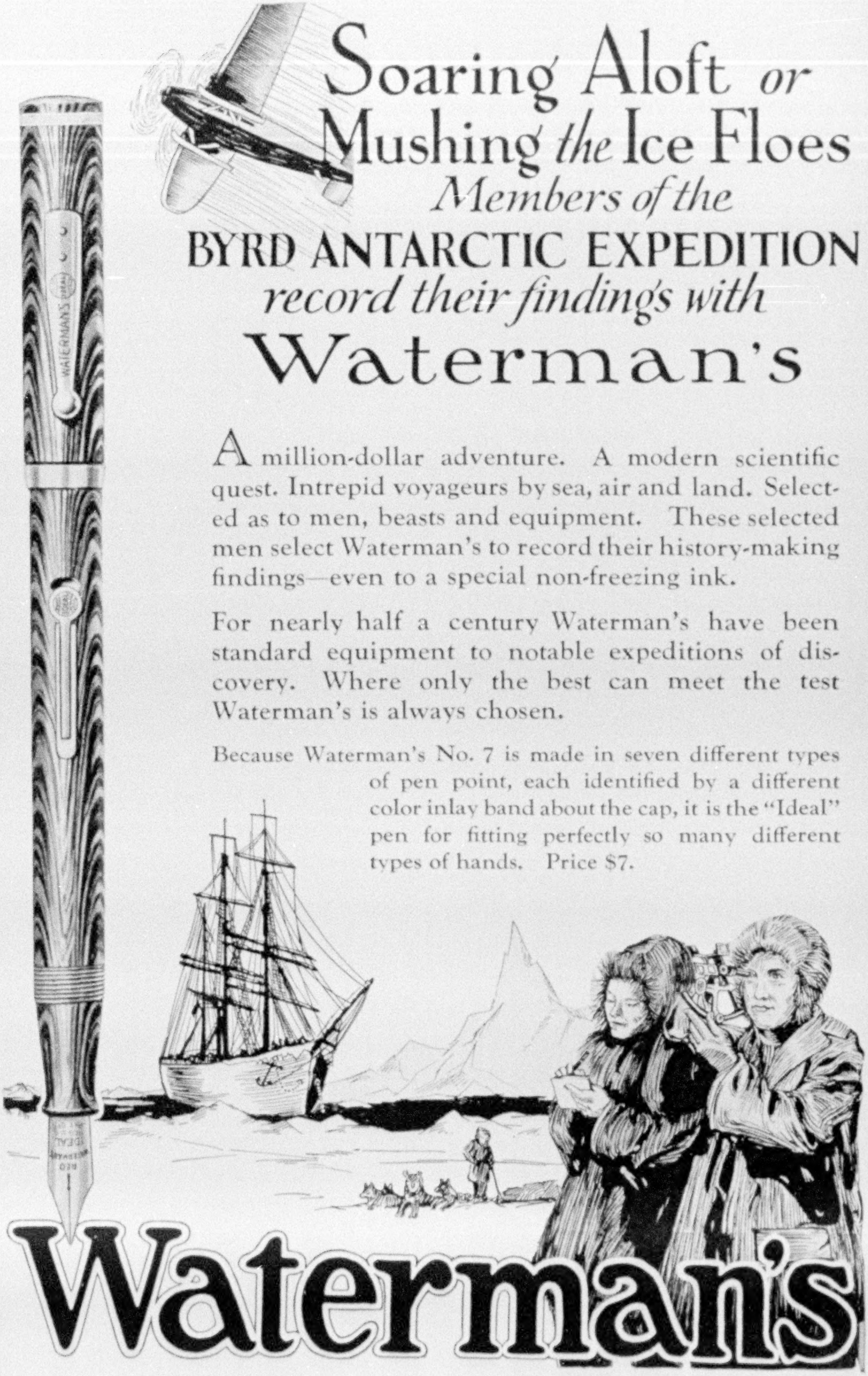

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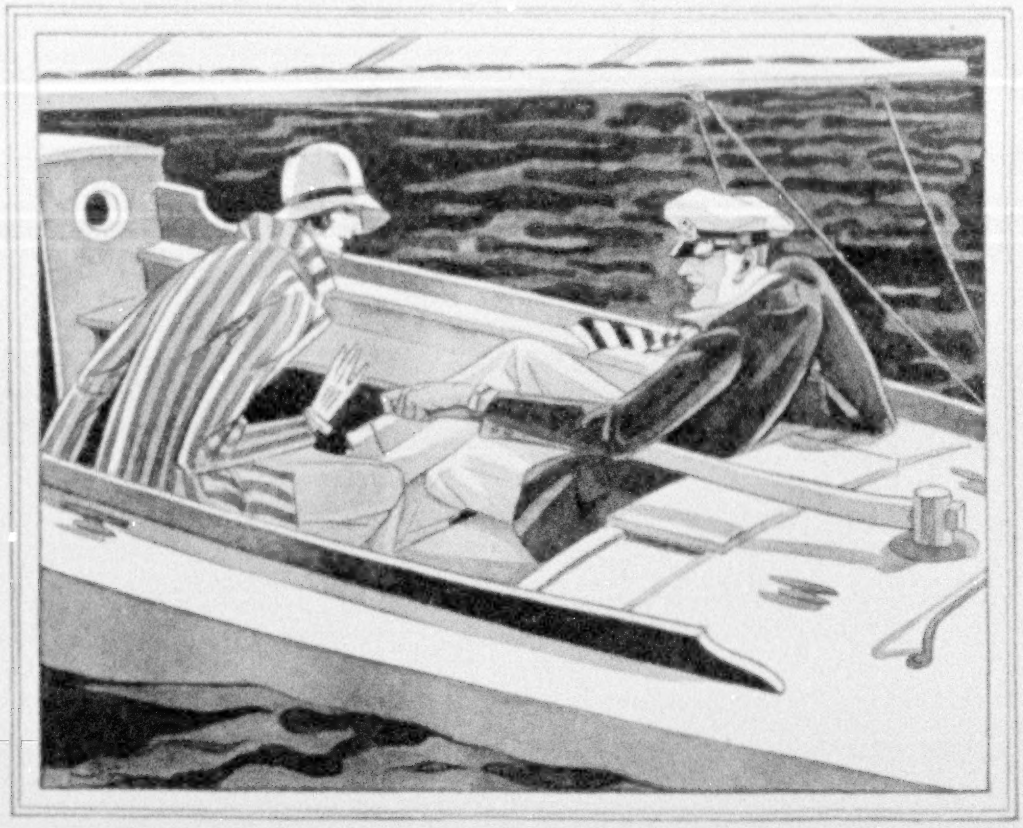

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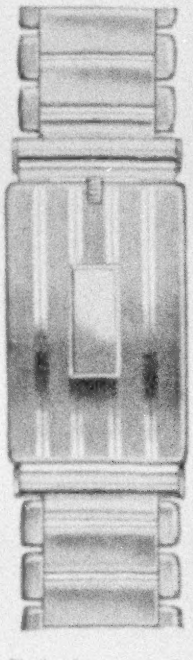

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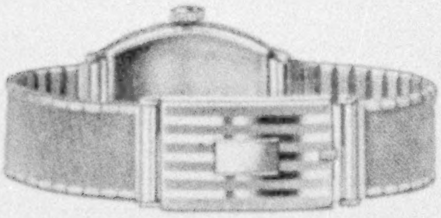

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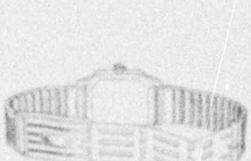

Completely expanded. Ample allowance for free passage over hand or up on forearm.

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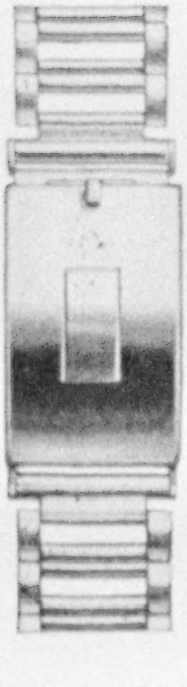

Open-link mesh band

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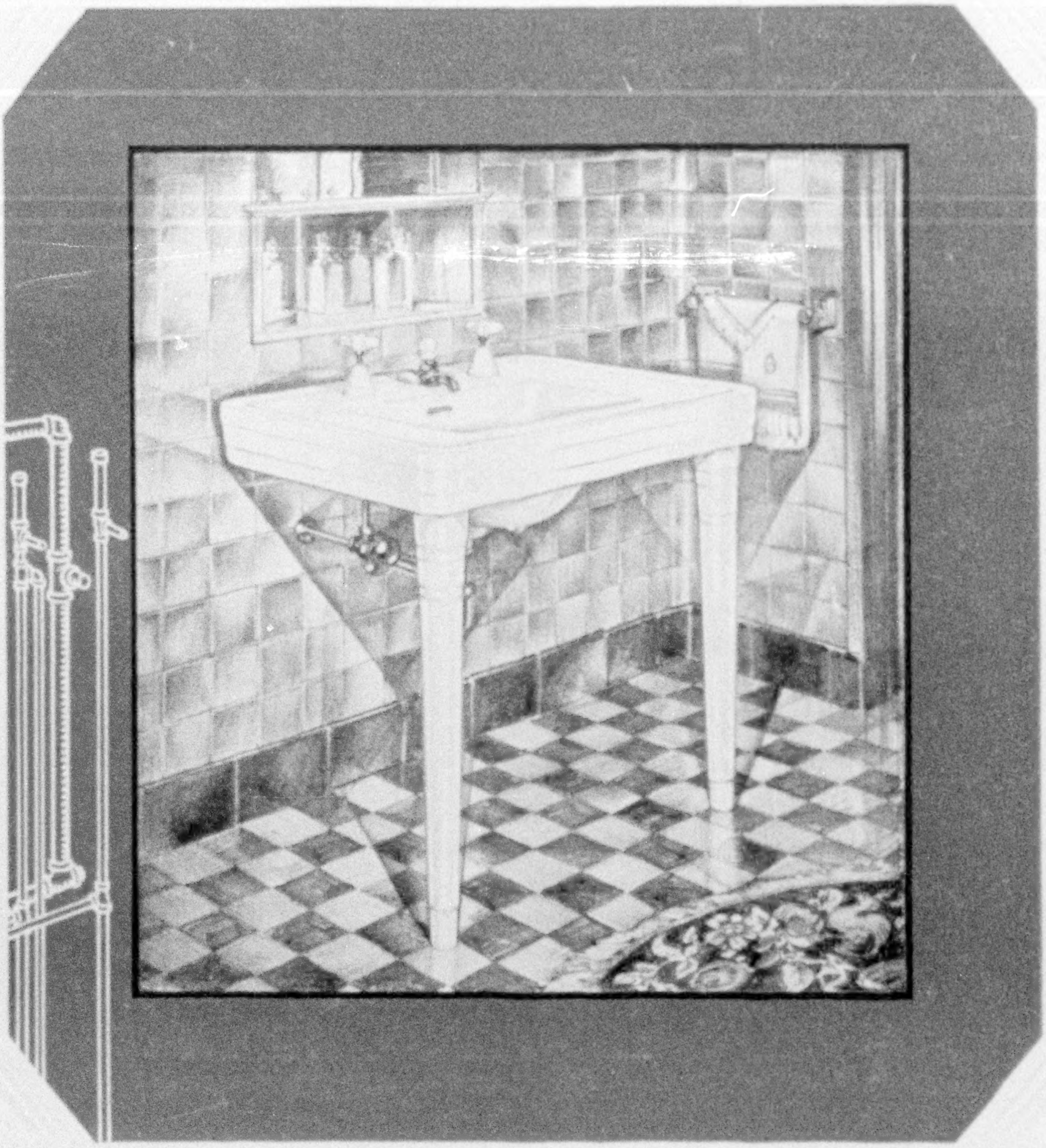

Worthy is this *Corwith* lavatory to suggest the decorative scheme for your bathroom. Its lines, sculptural in their simplicity, are a triumph of applied design, modern as tomorrow. Its fittings, chromium plated, are gem-hard, and lustrous as platinum. Its ware, twice-fired vitreous china, is stainfree and durable. To please individual taste, the slab can be mounted on metal legs instead of china, or on a pedestal. Like its companion pieces, the *Corwith* bath, dressing table, and sink, it can be had in glistening white or in color. If you are planning to build or remodel, go with your plumbing contractor to the nearby Crane Exhibit Rooms and view this masterpiece.

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